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OIL AND GAS DEVELOPMENTS IN PENNSYLVANIA IN 1960

By
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Addison S. Cate, Walter R. Wagner

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ABSTRACT

Exploration in Pennsylvania during 1960 resulted in the discovery of 1 new gas field, 8 new gas pools, and 1 deeper gas pool. It also extended several gas-producing areas, and established a new producing-depth record for the State.

After drilling a dry hole to the Gatesburg Formation (Upper Cambrian) in each of their 2 offshore blocks in Lake Erie, the New York State Natural Gas Corporation surrendered their acreage. The new producing depth record was established by the Robert I. Snyder No. 1 well in Somerset County when gas was found in the Oriskany at 8,574 ft. The well had an initial open-flow, after fracturing, of 1,572 MCFPD of gas at a rock pressure of 3,293 psi. in 44 hrs. The outstanding discoveries were the DuBois and Helvetia Pools in Clearfield County in the Punxsutawney-Driftwood Field and the Baldwin Pool of Westmoreland County in the Johnstown Field. The greatest density of deep drilling (Middle Devonian or older) occurred in Clearfield County where 46 gas wells were drilled. As in the previous year Armstrong County had the greatest number of shallow-sand completions (Upper Devonian or younger) outside of the secondary-recovery areas with the drilling of 54 new gas wells. The new field and new pools discovered during the year were the results of deep exploration.

Completions in Pennsylvania during 1960 totaled 871, or 121 more than in 1959. Of the 871 current year completions, 836 were in proven fields, and 35 were exploratory tests. Of the 836 proven field wells, 278 were oil, 240 gas, 236 water input, 7 gas input, 2 gas storage, and 73 dry. Of the 278 oil wells, 254 were drilled in connection with secondary-recovery operations. Of the 35 exploratory tests, 9 were gas and 26 were dry. Of the 372 completions drilled outside of underground gas storage or secondary-recovery operations, 99 were dry, a dry hole ratio of 1 in slightly over 3.7. The total footage drilled during the year was 2,430,280 ft.

Exploratory tests totaled 35, drilling a total of 185,780 ft. of hole, or an average per well of 5,300 ft. Of the 35 exploratory tests, 9 were successful and 26 were dry, giving a success ratio of 1 in 3.9, or a failure ratio of 1 in 1.4.

Oil pipe line runs totaled 5,942,000 bbls., or an increase of 3.2 percent over the 1959 figure of 5,760,000 bbls. (revised). The 1960 production was gathered by 7 pipe line companies. 67,000 bbls. of distillate

were produced. Proven oil reserves as of December 31, 1960 were estimated at 107,632,000 bbls. (revised) and distillate reserves of 2,110,000 bbls. Gas produced totaled 119,671,000 MCF as compared with 118,862,000 MCF in 1959. Gas reserves were estimated at 1,192,132,000 MCF at the end of the year. The total reservoir capacity for storage of natural gas in Pennsylvania is 454,251,634 MCF.

The undeveloped acreage leased is estimated at 11,000,000 acres. There were 26,131 acres of State owned land leased at a yearly rental ranging from $3.00 to $36.78 per acre and royalties ranging from $0.04 to $0.0832 per MCF for gas and one-eighth royalty for oil.

Out of 231 seismic crew weeks spent in the Appalachian Basin, 104 seismic crew weeks were logged in Pennsylvania. A number of geological field parties were active during the year. The airborne magnetometer survey of the Appalachian Basin area is nearing completion. This survey by a private company will cover 129,500 sq. mi. and will be completed in July 1961. The aeromagnetic maps will be offered to oil and gas companies for purchase.

INTRODUCTION

The oil and gas developments of 1960 for Pennsylvania are summarized in this publication. The skeletal logs of the deep wells (those which reached rocks of Middle Devonian age or older) drilled during the year are recorded in Table 11. The logs are supplementary to those published in Bulletins M31, M39 and M45. At the writing of this report Bulletin M45 is in press. The skeletal logs and information published in M45 had been published previously in Progress Reports 150, 151, 154, 155, and 157. All of these reports are of the Fourth Series of the Pennsylvania Bureau of Topographic and Geologic Survey. Bulletin M31 includes those deep wells completed prior to 1950, Bulletin M39 includes those drilled during the period 1950 to 1954 inclusive, and Bulletin M45 includes those drilled during the period 1955 to 1959 inclusive. Activities in the shallow sands (Upper Devonian or younger) since 1950 are described in Progress Reports 135, 139, 143, 144, 147, 150, 151, 154, 155, and 157 of the Survey.

Drilling activity to the deep horizons remained at about the same level as it did in 1959 while shallow well drilling increased approximately 19 percent. Crude oil prices reached a high of $4.80 per barrel in the Bradford District on August 1, 1960 after starting the year at $4.40 per barrel. Only twice during the last 30 years has the price of crude oil been as high or higher; in 1948 oil was $5.00 per barrel and in 1957 it was $4.88 per barrel. In the other districts in the State, crude oil prices also increased.

Table 1. is a summary of both the deep and shallow wells drilled during 1960, exclusive of those drilled in connection with underground gas storage and secondary-recovery oil operations.

TABLE 1. DEEP AND SHALLOW-WELL COMPLETION SUMMARY, PENNSYLVANIA, 1960 *

Completions	Oil	Gas	Dry	Total	Percent Successful
Exploratory tests	-	9	26	35	26
Development wells *	24	240	73	337	78
Totals	24	249	99	372	73

* Does not include wells drilled in connection with underground gas storage or secondary-recovery oil operations.

Crude oil and natural gas production for the year as well as the oil and gas reserves, as of December 31, 1960, are shown in Table 2.

TABLE 2. PRODUCTION AND RESERVES, PENNSYLVANIA, 1960

	1959	1960	Cumulative Total to 12/31/60	Reserves 12/31/60
Oil (bbls.)	5,760,065*	5,942,000	1,230,392,000*	108,028,000*
Gas (MCF)	118,862,000	119,671,000	7,410,420,000	1,192,132,000

* corrected figures

Table 12 lists the deep wells from which drill cuttings were collected during the year. This list is a supplement to the Survey's "Catalogue of Deep Well Samples" (I.C.No. 16), as is the list published in Progress Report 157 in 1960. Sampled wells listed in I.C.No. 16 plus those listed in P.R.157 and on table 12 of this publication comprises a complete catalogue of the deep wells sampled in Pennsylvania up to the end of 1960.

ACKNOWLEDGEMENTS

In connection with the preparation of this review, the writers acknowledge the cooperation of Robert N. Metzler, the Bradford District Producers Association, and the Northeastern Gas and Oil Scouts. Virginia Fairall and Lillian Heeren of the Pennsylvania Bureau of Topographic and Geologic Survey did the drafting and assisted with the compiling of the data.

DEEP-SAND EXPLORATION AND DEVELOPMENT

Deep-sand exploration in Pennsylvania during 1960 resulted in the discovery of 1 new gas field, 8 new gas pools, (one of which was discovered by an outpost well) and a successful deeper-pool test. Deep-sand exploration also extended old fields and pools, and established a new producing-depth record in the State. Also a number of important dry exploratory tests were drilled during the year. The new producing-depth record for Pennsylvania was established by the Robert I. Snyder No. 1 well in Somerset County when gas was found in the Oriskany Sandstone at 8,574 ft. The well had an initial open-flow after fracturing of 1,572 MCF of gas at a rock

Table 3 lists the number of active oil wells and the amount of crude oil produced in Pennsylvania by counties for 1959 and 1960.

TABLE 3. OIL WELLS AND CRUDE OIL PRODUCTION IN PENNSYLVANIA BY COUNTIES: 1959 and 1960 *

County	1959 Number of producing oil wells	1959 Crude oil production (bbls.)	1960 Number of producing oil wells	1960 Crude oil production (bbls.)
Allegheny	415	128,783	407	123,008
Armstrong	177	12,961	175	12,763
Beaver	150	11,116	141	9,824
Butler	2,611	172,090	2,528	162,702
Clarion	1,025	52,880	1,011	47,908
Crawford	618	29,391	519	25,180
Elk	677	25,632	644	22,736
Fayette	5	277	5	370
Forest	1,000	92,369	1,025	53,325
Greene	315	60,346	313	58,087
Jefferson	91	4,183	91	3,833
McKean	29,323	4,344,379	28,535	4,552,726
Mercer	227	3,650	227	3,549
Potter	418	79,442	418	65,417
Tioga	16	1,532	16	1,197
Venango	17,945	422,177	16,860	373,682
Warren	8,465	274,452	8,117	256,530
Washington	861	180,160	864	177,686
Total	64,340	5,895,820	61,896	5,950,523

* Data from Bureau of Statistics, Department of Internal Affairs, Harrisburg, Pennsylvania.

pressure of 3,293 psi. in 44 hrs. The New York State Natural Gas Corporation has plugged both offshore Lake Erie wells and surrendered its offshore acreage. The greatest density of deep drilling operations was in Clearfield County where 2 new gas pools were discovered and 46 gas wells were drilled in developed acreage.

Table 11 contains the skeletal logs of the deep wells completed in the State during 1960. Plate 7 shows the locations of these deep wells. The pre-Upper Devonian stratigraphy of the Kardosh No. 1 well, the only well drilled to the Precambrian in Pennsylvania, is shown on Plate 1. A total of 2,115 deep wells had been drilled in the State at the end of 1960. Of the 2,115 deep wells drilled to date, 1,208 were gas wells, 2 were oil and gas wells, 835 were dry holes, 69 were drilled for gas storage and 1 is to be used as a disposal well for waste pickle liquor.

During 1960 there were 113 wells drilled to the Oriskany Formation or deeper; 70 were gas wells and 43 were dry holes. 11 wells were completed in the Onondaga chert, 4 of which produced gas. 2 wells were abandoned in the Middle Devonian before reaching the Onondaga Formation. Of the 126 deep wells completed during the year, 63 wells were fractured and 57 of these were completed as gas wells. The total open-flow capacities before fracturing amounted to 122,868 MCF of gas daily, compared with 470,919 MCF of gas per day after fracturing. 17 gas wells were not fractured and their total initial open-flow capacities amounted to 142,744 MCF of gas daily. The largest initial open-flow potential was 31,272 MCF of gas daily after fracturing from a Clearfield County well, Green Glen Wt. 3954 No. 12. The total footage of deep wells drilled amounted to 851,347 ft. 109 of the deep wells completed during the year were drilled with rotary tools, most of these with air rotary, and 17 with cable tools.

There were 126 deep wells completed in 1960, as compared with 122 in 1959. The greatest number of completions occurred in the DuBois Pool, a new discovery of 1960 in Clearfield County, where during the year, 29 gas producers and 8 dry holes were drilled. The Helvetia Pool, another new pool discovered during the year, was second in number of wells completed, with 11 gas producers and 3 dry holes.

Summarized in Table 4 below are the deep well completions for Pennsylvania during 1960.

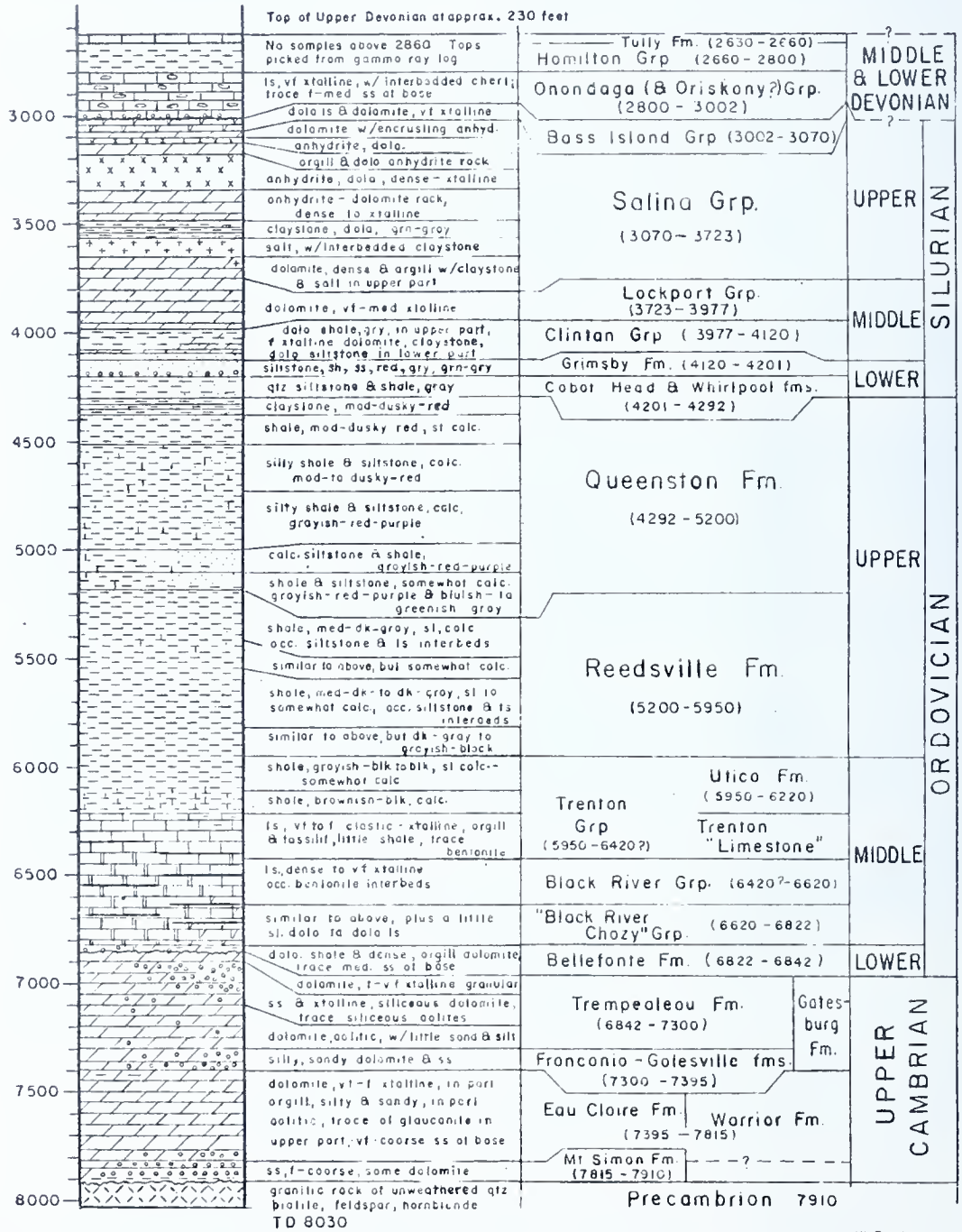
TABLE 4. SUMMARY OF DEEP WELL COMPLETIONS
PENNSYLVANIA, 1960

	Development		Wildcat		Total
Gas	65		9		74
Dry		34		18	52
Footage	442,587	238,980	60,802	108,978	851,347

Pre-Upper Devonian Stratigraphy of KARDOSH No.1 Well

by M.L. Benedum & Arkansas-Louisiana Gas Co.

Summerhill Twp., Crawford Co., Pennsylvania



W R Wagner
Jan 1960

Plate I

Figure 1 shows the annual rate of deep-sand exploration and development since the discovery of the Tioga Field in 1930, the first deep-sand field to be opened in Pennsylvania. The 1960 discoveries are listed in Table 5 and the more important dry exploratory tests in Table 6. Information on the deep-sand gas pools and fields, including production statistics, are recorded in Table 7.

Developments in the Jacksonville and Nolo Gas Fields

The Jacksonville Field is in southwestern Indiana County astride the Grapeville-Jacksonville Anticline. It was discovered in September, 1956, upon the successful completion of the G. L. Stewart-R. & P. Coal Co. well No. 1 by Manufacturers Light & Heat Company. It was drilled in the southern part of what was later to prove to be the productive acreage in the field. (Elders Ridge Quad. well No. 3).

The structure of the anticline (see Plate 2) is complicated by NE-SW trending reverse faults which bound the horst and graben blocks; vertical displacement of as much as 200' has been observed. Approximately 1700 acres are productive of gas from the Onondaga-Oriskany interval. At the north end of the field a low area, resulting from either a syncline or fault, separates the major part of the field from a paralleling en-echelon trend of production and structural high on which 5 gas wells have been drilled.

The productive interval in the area is typical of the region of west central Pennsylvania - it includes the lower cherty section of the Onondaga and the underlying sandy portion of the Oriskany. Two wells (Elders Ridge No. 29 and No. 36) were completed as gas wells in the chert without reaching the Oriskany; the other gas wells produce from either the combined Onondaga-Oriskany interval or the Oriskany alone. The thickness of the Oriskany varies from 14' to 31' in the field. Stratigraphic control of production cannot be demonstrated to be of important significance in the Jacksonville Field - or, at any rate, its significance is masked by structural features.

Since the discovery date 23 wells have been successfully completed, and there have been 8 unsuccessful wells drilled adjacent to productive acreage. The last well drilled in the field (Elders Ridge No. 40) was completed in March, 1959, and since then exploitation drilling activity has been at a standstill.

Approximately 14,500 MMCF of gas have been withdrawn from the field (as of Jan. 1, 1961). The average initial open-flow of the wells (after fracturing) was 2,250 MCF, with an initial reservoir pressure of about 4,035 psi.

The Nolo Field, like the Jacksonville Field, is in Southern Indiana County and was discovered in September, 1956 (shortly after discovery of Jacksonville Field). The discovery well was the I. R. Smith No. 1 well drilled by Columbian Carbon Company very close to the southern end of what was later to be defined as the productive limit of the field; it is well No. 5 in New Florence Quad.

TABLE 5 IMPORTANT DISCOVERIES IN PENNSYLVANIA, 1960

1	2	3	4	5	6	7	8	9
Map No.	Operator	Well Name	Well Location	Compl. Date	Total Depth (Feet)	Prod. Depth (Feet)	Initial Gas-MCF/D	Production Formation
14	New York State Nat. Gas Corp.	R.H.Kriner 1	Brady Twp. Clearfield Co.	5/11/60	7,248	7,157	10,645	Onondaga chert & Oriskany
44	Sam Jack Drilling Co.	Green Glen Wt. 3594, 1-1	Sandy Twp. Clearfield Co.	1/6/60	7,320	7,274	30,370 after frac	Onondaga chert & Oriskany
68	G.Hall, et al	J. Lehman	Spring Twp. Crawford Co.	9/1/60	3,600	3,580	6,200 natural	Red Medina
82	Belmont Oil Corp.	Pa.Game Comm. Tr.101-A, No. 1	Conneaut Twp. Erie Co.	8/10/60	3,417	3,338	600 after frac	White Medina
85	T.Vandenberg	D.W. Simpson 1	North East Twp. Erie Co.	10/17/60	2,957	2,774	430 after frac	Medina
90	Snee & Eberly & Peoples Nat. Gas Co.	Earl Rahl 1 Fayette Co.	Wharton Twp. Fayette Co.	12/31/60	8,022	7,602	381 after frac	Onondaga chert
94	New York State Nat.Gas Corp.	Burt Walls 1	Winslow Twp. Jefferson Co.	10/11/60	7,289	7,250	1,061 natural	Oriskany
98	Thunder Rock Producers	Mallory, et al 1	Foster Twp. McKean Co.	12/1/60	4,685	4,683	500 natural	Oriskany
103	Mfrs.Light & Heat Co.	Pa.Game Lands Tr.111-A, No. 1	Lower Turkey Foot Twp. Somerset Co.	2/25/60	8,435	8,147	1,917 after frac	Onondaga chert
109	Belmont Oil Corp & Peoples Nat.Gas Co.	Robert Snyder 1	Lincoln Twp. Somerset Co.	6/16/60	8,625	8,414	1,572 after frac	Onondaga chert & Oriskany
124	Belmont Oil Corp.	Pa.Game Comm. Tr.42, No. 3	St.Clair Twp. Westmoreland Co.	5/22/60	7,495	7,435	1,000 natural	Onondaga chert

TABLE 6 IMPORTANT DRY EXPLORATORY TESTS IN PENNSYLVANIA, 1960

1	2	3	4	5	6	7	8
Map No.	Operator	Well Name	Well Location	Expl. Class	Compl Date	Total Depth (Feet)	Deepest Formation Reached
29	Belmont Oil Corp.	Deemer-Green Glen No. 2	Sandy Twp. Clearfield Co.	NFW	2/12/60	7,543	Oriskany
75	New York State Nat. Gas Corp.	A.J.Palumbo No.11	Jay Twp. Elk Co.	NFW	12/27/60	7,574	Hamilton
77	Russell McConnell	Borst No. 1	Conneaut Twp Erie Co.	NFW	8/26/60	5,935	Gatesburg
88	Manufactuters Lt. & Ht. Co.	Frank G.Stewart	Henry Clay Twp. Fayette Co.	NFW	12/5/60	8,831	Helderberg
90	John T. Galey	M.A.Herrington	Franklin Twp. Greene Co.	DPT	12/5/60	8,067	Helderberg
93	Sam Jack Drilling Co.	J. Bobal No. 1	Winslow Twp. Jefferson Co.	NFW	10/25/60	7,112	Helderberg
97	Aladdan Petroleum Corp.	L.B.Humphrey Estate No. 1	Snyder Twp. Jefferson Co.	NFW	3/28/60	7,139	Helderberg
114	Engles	Burkhardt	Sugar Creek Twp. Venango Co.	DPT	11/30/60	3,913	Oriskany
115	Biery & Johnson Co.	Frank Kapp No.1	Limestone Twp. Warren Co.	NFW	9/27/60	5,850	Queenston

10	11	12	13
Deepest Formation Reached	Field or Pool	Expl. Cl.	Remarks
Helderberg	Helvetia	NP	Disc. well, Helvetia Pool, Punxsutawney-Driftwood Field N.W. flank Chestnut Ridge Anticline
Oriskany	DuBois	NP	Disc. well DuBois Pool Punxsutawney-Driftwood Field, S. E. flank Sabinsville Anticline
Medina	Indian Spring	Ext.	Largest Medina gas producer in Pa. in Conneaut Field R. P. 1100 psi in 24 hrs.
Queenston	Tracy	NP	Disc. well Tracy Pool, Medina Play N.W. Pa. in Conneaut Field
Queenston	Burgess	NF	Disc. well Burgess Field N.W. Pa.
Oriskany	East Summit	NP	Disc. well separate fault block on S. E. flank of Chestnut Ridge Anticline, Summit Field
Helderberg	Sykesville	NP	Disc. well Sykesville Pool near axis of Caledonia Syncline
Helderberg	Mallory	DP	Disc. well Mallory Pool, Bradford Field
Helderberg	Rugg	NP	Disc. well Rugg Pool, Ohiopyle Field, S. E. flank of Laurel Hill Anticline
Oriskany	Snyder	NP	Disc. well separate fault block on W. flank of Boswell Dome
Onondaga	Baldwin	NP	Disc. well Baldwin pool, Johnstown Field on Laurel Hill Anticline

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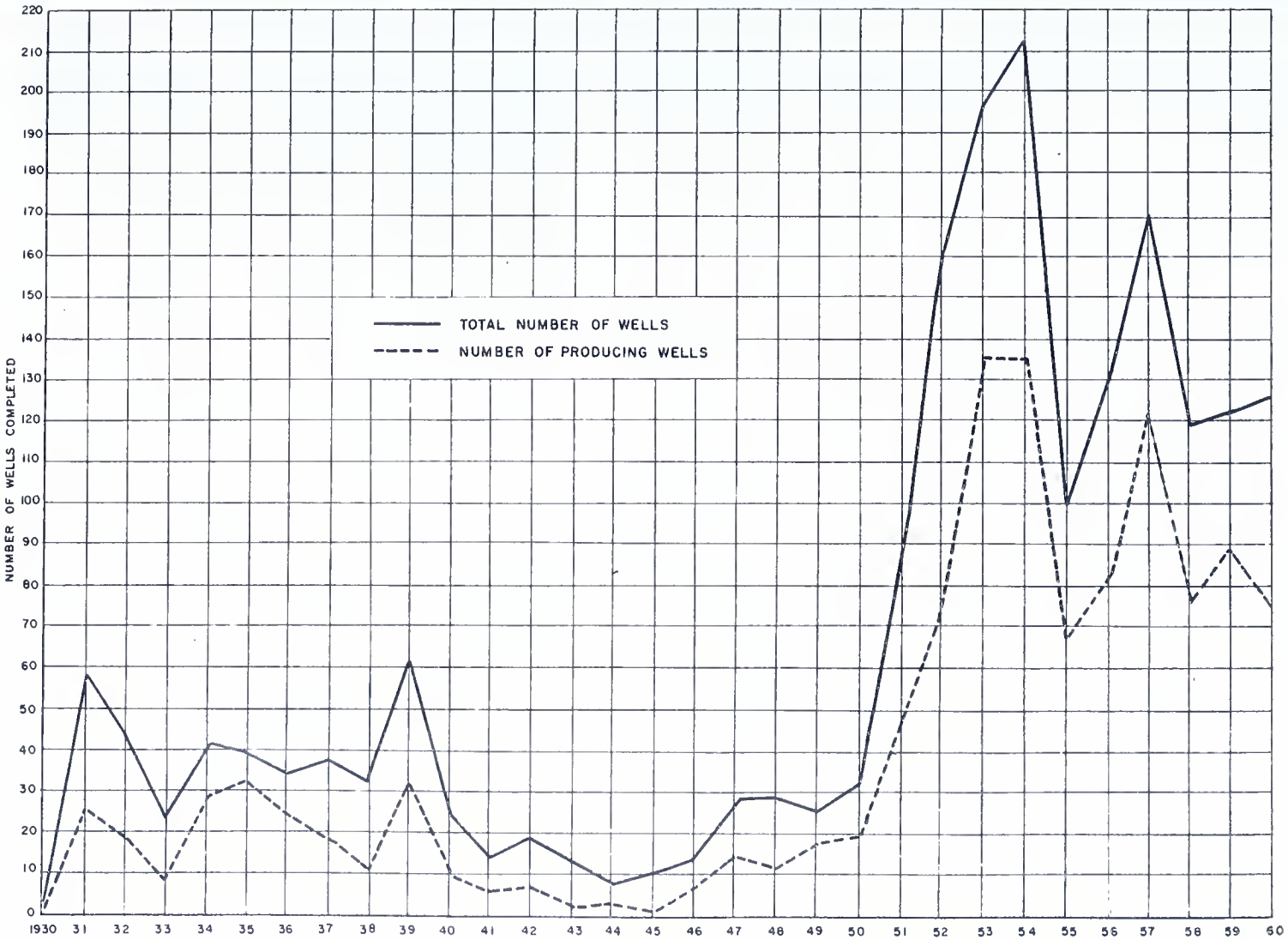
Remarks
Lower Dev. test along Boone Mt. trend, southeast flank of Sabinsville Anticline, defined southwest limit of Boone Mt. Pool
Middle Dev. test, attempted to find Oriskany along flank of Sabinsville Anticline along production trend.
Upper Cambrian test. First well drilled in the State with an appreciable show of gas in Gatesburg.
Lower Dev. test along Laurel Hill Anticline. Tried to find new production south of Ohiopyle Field.
Lower Dev. test on Waynesburg Dome-Bellevernon Anticline. First deep test in Greene County since 1942.
Lower Dev. test on southeast flank of Sabinsville Anticline. Failed to extend trend to southwest.
Lower Dev. test in Shawmut Syncline where Oriskany sandstone was found to be absent
Fourth deep well in Venango County
Upper Ordovician test in N.W. Pa. Had show of gas in Red Medina. Lost hole.

TABLE 7 DEEP GAS PRODUCTION IN PENNSYLVANIA, 1960

County	Field	Pool	Discovery Date	Production in MCF: Cumulative Production at End of 1959	Production in MCF: Production 1960	Production in MCF: Cumulative Production at End of 1960	Status of Field or Pool at end 1960
Armstrong	Shellhammer	Rupert	11/14/58	157,889	62,934	220,823	Producing
Bedford	Purcell		12/14/57	connected into line at end of 1960			Producing
Cameron, Elk, Jefferson, Clearfield, & Indiana	Punxsutawney-Driftwood		9/15/51	314,200,000	60,300,000	374,500,000	Producing
		Benezette	1/5/53	217,000,000	5,000,000	222,000,000	Producing
		Driftwood	9/15/51				
		Boone Mt.	8/19/58	20,000,000	42,000,000	62,000,000	Producing
		DuBois	1/6/60				
		Helvetia	5/11/60				
		Rockton	2/25/55	75,000,000	13,000,000	88,000,000	Producing
		Reed	5/9/55				
		Deemer	12/1/53				
		Hicks Run	6/7/56	2,200,000	300,000	2,500,000	Producing
		Sykesville	11/10/60				1960 Discovery
			1/9/50	153,700,000	1,440,200	155,140,400	Producing and Gas Storage
		Greenlick	1/25/55	48,100,000	900,000	49,000,000	Producing
		Downs	5/18/54	11,400,000		11,400,000	Gas Storage 1959
		Tamarack	2/25/52				
		Ole Bull	1/9/59	200,200	540,200	740,400	Producing
		Leidy	1/9/50	94,000,000		94,000,000	Gas Storage 1959
Crawford & Erie	Conneaut		9/11/57			162,500	Producing-shut in
		Indian Spring	9/11/57	?	?	162,500	Producing
		Lexington	9/26/59				
		Beaver Creek	5/26/49				Shut In
		Blass	7/2/58				Shut In
		Conneaut	9/18/59				Shut In
		Foro	1/14/58				Shut In
		Penside	9/9/59				Shut In
		Pierce	12/31/58				Shut In
		Roberts	11/1/58				Shut In
		Tracy	8/10/60				1960 Discovery
[illegible]	[illegible]		4/29/47			853,800	Producing and Gas Storage
		Corry	4/29/47	853,700		853,700	Gas Storage 1955
		Beaver Dam	5/20/53	?	?	100,100	Producing
	[illegible]		8/23/46	4,886,600		4,886,600	Gas Storage 1959
	Tillibreville		7/17/56	5,000		5,000	Shut In
[illegible]	[illegible]		3/24/38	38,286,839	439,747	38,726,586	Producing
		North Summit	3/24/38	19,734,581	135,051	19,869,632	Producing
		South Summit	5/9/43	18,552,258	304,696	18,856,954	Producing
		East Summit	12/31/60				1960 Discovery
	Temple		12/28/59	connected into line at end of 1960			Producing
		Rice	2/25/60				1960 Discovery
Tarport	Sharon Hill		8/21/56	13,081,658	1,453,580	14,535,238	Producing
	Wick		8/30/56	4,300,000	700,000	5,000,000	Producing
[illegible]	[illegible]		2/23/22	?	?	32,347,000	Producing
	[illegible]		2/1/23			78,000,000	Producing
		Sheshequin Center	1/3/23				Producing
		Pilgrim	2/1/23	?	?	78,000,000	Producing
		East Sheshequin	7/15/36				Producing
	Harrison		6/15/34	33,374,000		33,374,000	Shut In & Gas Storage
	[illegible]		5/16/38	600,000		600,000	Shut In
		Harrison	6/15/34	33,374,000		33,374,000	Gas Storage 1959
	Warren		12/3/31			44,563,000	Shut In & Gas Storage
		Chamberlin	1/3/34	500,000		500,000	Shut In
		Mahron	12/3/31	44,063,000		44,063,000	Gas Storage 1959
	Sharon		12/23/38	11,565,000		11,565,000	Gas Storage 1948
	Ulysses		10/2/39	?	?	1,400,000	Producing
Somerset	Boswell		11/11/58	1,375,254	1,536,152	2,911,406	Producing
		Boswell	11/11/58	1,375,254	1,471,156	2,846,410	Producing
		Snyder	6/16/60		64,996	64,996	Producing
Tioga	Sabinsville		8/19/35	32,680,000		32,680,000	Gas Storage 1951
	Tioga		Sept.1930	37,213,000		37,213,000	Gas Storage
		East Tioga (Borm)	1930				Gas Storage 1940
		Mosher	1930	37,213,000		37,213,000	Gas Storage 1935
		West Tioga (Palmer)	1930				Gas Storage 1935
Westmoreland	Dry Ridge		8/25/46				
	Lycippus		8/17/49	3,751,896	321,218	4,073,114	Producing
		Derry	12/5/58		8,506	8,506	Producing
		Piper	8/17/49	597,426	13,126	610,552	Producing
		St.Boniface Chapel	9/13/56	3,154,470	299,586	3,454,056	Producing
Westmoreland & Somerset	Johnstown		5/15/57	3,826,316	1,961,596	5,787,912	Producing
		Baldwin	5/22/60				
		Beck	5/16/57	712,152	598,728	1,310,880	Producing
		Williams	2/14/58	3,114,164	1,362,868	4,477,032	Producing
	Seven Springs		12/5/ 58	561,649	1,394,385	1,956,034	Producing
		Blair	12/5/58	458,872	1,320,567	1,779,439	Producing
		Kooser	5/19/59	102,777	73,818	176,595	Producing



ANNUAL RATE OF DEEP SAND EXPLORATION AND DEVELOPMENT

Figure 1

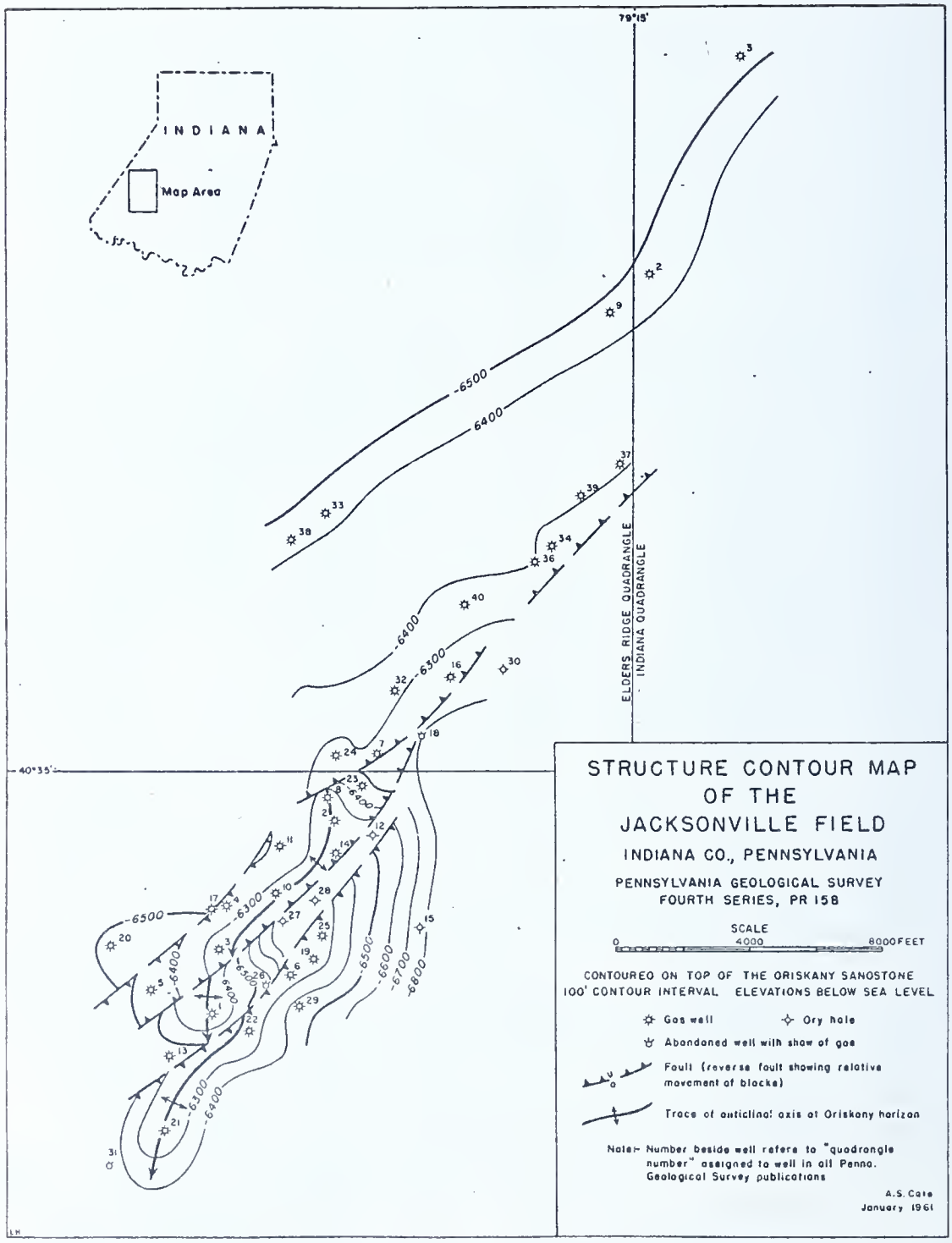

INDIANA
Map Area
79°15'
40°35'
ELDERS RIDGE QUADRANGLE
INDIANA QUADRANGLE
-6500
-6400
-6300
-6200
-6100
-6000
-6600
-6700
-6800
STRUCTURE CONTOUR MAP
OF THE
JACKSONVILLE FIELD
INDIANA CO., PENNSYLVANIA
PENNSYLVANIA GEOLOGICAL SURVEY
FOURTH SERIES, PR 158
SCALE
0 4000 8000 FEET
CONTOURED ON TOP OF THE ORISKANY SANDSTONE
100' CONTOUR INTERVAL ELEVATIONS BELOW SEA LEVEL
Gas well
Dry hole
Abandoned well with show of gas
Fault (reverse fault showing relative movement of blocks)
Trace of anticlinal axis of Oriskany horizon
Note:- Number beside well refers to "quadrangle number" assigned to well in all Penna. Geological Survey publications
A.S. Cate
January 1961

Plate 2

Nolo Anticline, on which the field is located, is a structure between the Chestnut Ridge and Laurel Hill anticlinal trends. The main part of the field is divided into three structural elements by reverse faults trending NE-SW across the anticline (see Plate 3). To the north of the main part of the field, across a saddle, but on the same anticlinal trend, four wells were drilled and a small amount of gas produced prior to discovery and exploitation of the main part of the field; as of this date (January 1961) it is believed that only one well (Barnesboro Quad No. 2) is still producing. A small amount of gas was produced from Barnesboro Quad. No. 4 (low on the northwest flank of the main structure) before it was abandoned. This well was drilled, as were the wells to the northeast of it, before the main part of the field was developed.

As is the case with the Jacksonville Field the importance of stratigraphic control of production is not appreciable. The Onondaga-Oriskany interval is treated as a single reservoir in most wells. Five wells, however, in the southern part of the field, New Florence Quad wells Nos. 6, 9, 10, 11, and 12, produce from the Onondaga chert alone, never having reached the Oriskany. Thickness of the Oriskany sandstone in the field varies from 16' to 38'.

There have been 17 producers drilled in the main part of the field - an area of 2600 acres. One unsuccessful outstep well was drilled in 1960, but the field was rather well defined by early 1959. 5,000 MMCF of gas has been withdrawn from the main part of the field. The average of initial well gaugings (after fracturing) was 3,670 MCF per day, and the initial pressure was about 4,250 psi.

Developments in Other Deep Gas Fields

After drilling two wells to the Gatesburg Formation (Upper Cambrian) on their two offshore blocks in Lake Erie, the New York State Natural Gas Corporation has plugged and abandoned the two wells and surrendered their acreage. There has been no other offshore acreage leased from the Pennsylvania Department of Forests and Waters. Erie County had 10 completions during the year. The only new field discovered in the State during the year was the Burgess Field in Erie County by the D. W. Tompson No. 1 by T. Vandenburg (No. 85 Plate 7 and Table 11). After fracturing the Medina (Lower Silurian) section, the well produced 430 MCF of gas with a rock pressure of 865 psi in 24 hrs. The Tracy Pool is a new pool discovered in western Erie County by the Felmont Oil Corporation. The well, Pennsylvania Game Commission Tract 101-A No. 1 (well No. 82, Plate 7 and Table 11), found gas in the Medina section. After fracturing, the well produced 600 MCF of gas at a rock pressure of 920 psi in 65 hrs. A nearby well, the Borst No. 1 (No. 77, Plate 7 and Table 11) by Russell McConnell, was the first well in Pennsylvania to find gas in the Gatesburg sandstone. After working with the well for a considerable length of time the operator was unable to make it a commercial well and the well was plugged and abandoned. The Lexington Pool had 3 successful development gas wells and one dry hole. A gas well and an unsuccessful outpost were drilled in the Conneaut Field. An unsuccessful new field wildcat was drilled to the Medina by Worldwide Petroleum Corporation in Girard Township, Erie County.

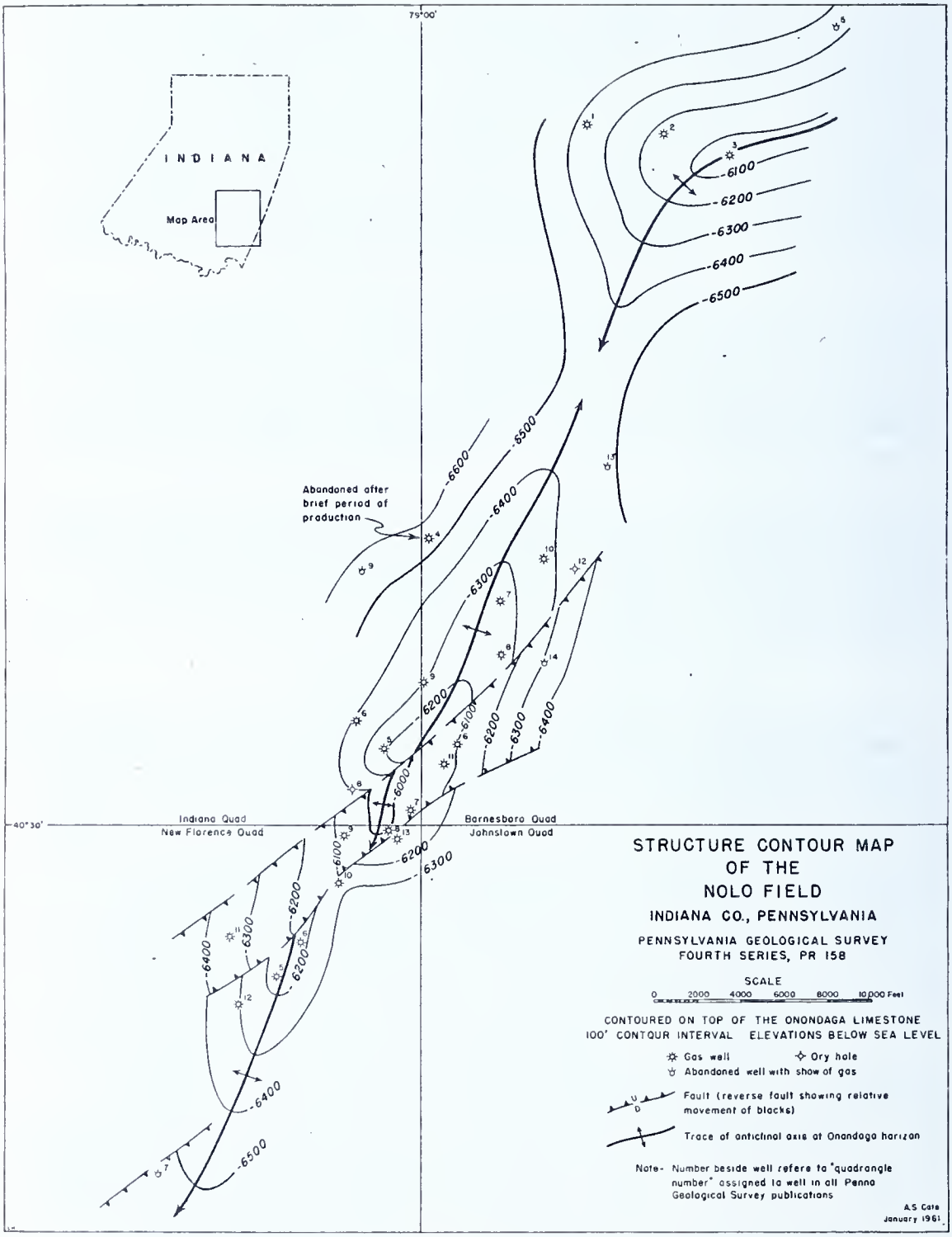

75°00'
INDIANA
Map Area
Abandoned after brief period of production
-6100
-6200
-6300
-6400
-6500
-6600
Indiana Quad
New Florence Quad
Barnesboro Quad
Johnstown Quad
40°30'
STRUCTURE CONTOUR MAP
OF THE
NOLO FIELD
INDIANA CO., PENNSYLVANIA
PENNSYLVANIA GEOLOGICAL SURVEY
FOURTH SERIES, PR 158
SCALE
0 2000 4000 6000 8000 10,000 Feet
CONTOURED ON TOP OF THE ONONDAGA LIMESTONE
100' CONTOUR INTERVAL ELEVATIONS BELOW SEA LEVEL
Gas well
Dry hole
Abandoned well with show of gas
Fault (reverse fault showing relative movement of blocks)
Trace of anticlinal axis at Onondaga horizon
Note- Number beside well refers to "quadrangle number" assigned to well in all Penna Geological Survey publications
A.S. Cate
January 1961

Plate 3

Crawford County had three completions during the year. The J. Lehman No. 1 (No. 68 on Plate 7 and Table 11) by G. Hall et al found gas in the Medina section and was completed as the largest Medina gas producer to date in Pennsylvania. This Indian Spring Pool well had a natural initial open-flow of 6,200 MCF of gas at a R.P. of 1100 psi in 24 hrs. The other two wells in the county were dry. One was completed at a total depth of 3,463 ft. in the Queenston (Upper Ordovician) Formation and the other dry hole in the Red Medina at a total depth of 3,488 ft.

The Frank Kapp No. 1 well (No. 115, Plate 7 and Table 11), by Bierv & Johnson Company, one of three dry holes drilled in 1960 in Warren County, was abandoned in the Queenston at a total depth of 5,850 ft. after finding some gas in the Red Medina. Considerable time was spent trying to complete this well as a commercial producer, but due to down-hole trouble the well finally was abandoned. One of the other two wells was abandoned after reaching the Onondaga and the other after reaching the Helderberg.

Beaver, Greene, Indiana, McKean, Venango, and Washington Counties each had one completion during the year. The Beaver County well (No. 1, Plate 7 and Table 11) was drilled to the Helderberg by the Jones & Laughlin Steel Corporation. Waste pickle liquor is to be injected into the Oriskany Sandstone at a depth of 5,388 ft. In Greene County the N. A. Herrington No. 1 (No. 90, Plate 7 Table 11) by John T. Galey was drilled on the Waynesburg Dome-Bellevernon Anticline, finding gas at 7,953 ft. in the Oriskany Sandstone. The well produced 42 MCF of gas (after fracturing) at a rock pressure of 2,775 psi. Though it produced into the line for a few months the well finally was abandoned. The Indiana County well in the Nolo Field was abandoned after reaching the Helderberg Limestone. A deeper pool test was successful in McKean County in the Bradford Field. This was the Mallory et al No. 1 by Thunder Rock Producers (No. 98, Plate 7 and Table 11) which found 500 MCF of gas and some distillate in the Oriskany at a rock pressure of 1,825 psi in 16 hrs; its completion marked the discovery of the Mallory Pool. An unsuccessful deeper pool test was drilled in the Sugar Creek Field in Venango County. The well, Burkhardt No. 1 (No. 114, Plate 7 and Table 11) by Engles, found saltwater in the Oriskany Sandstone at 3,913 ft. The Lewis Foley No. 1A by Benedum Trees Company in Washington County (No. 118, Plate 7 and Table 11) was abandoned after an attempt to make it productive from the Helderberg (Lower Devonian).

Tioga County had three unsuccessful new field wildcats drilled during 1960. They were all abandoned after finding the Oriskany Sandstone dry and reaching the Helderberg Limestone.

Three gas wells and one unsuccessful outpost were drilled in Potter County. The three Oriskany gas wells were drilled in the Ole Bull Pool in the Leidy Field by Phillips Petroleum Company. Their Pa. Tract 81 No. 6 well (No. 102, Plate 7 and Table 11) was completed at an open-flow of 7,770 MCF of gas at a rock pressure of 3,235 psi in 7 days. This is the largest producer in the field to date. The unsuccessful well (No. 99, Plate 7 and Table 11) was an outpost of the East Fork-Wharton Field. The Greenlick Pool and the Ole Bull Pool are the only pools now producing in the Leidy Field. The rest of the Leidy Field (the Leidy, Tamarack, and Downs Pools) have been converted to gas storage. As of January 1, 1961 the cumulative

production total for the Leidy Field was 155,140,000 MCF.

The Punxsutawney-Driftwood Field of Cameron, Clearfield, Elk, Indiana, and Jefferson Counties had 65 development wells drilled during the year. Of these, 47 were development gas wells and 18 were dry holes. 8 other wells were drilled in these counties, of which 3 were successful new pool wildcats, 2 unsuccessful new pool wildcats, and 3 unsuccessful new field wildcats. The 3 new pool wildcats discovered the DuBois, Helvetia, and Sykesville Pools. The DuBois Pool an extension of the Boone Mt. trend, was discovered by Green Glen Wt. 3594 No. 1-1 drilled by S. W. Jack Drilling Company (No. 44, Plate 7 and Table 11) with initial production in the Onondaga chert-Oriskany Sandstone interval of 30,370 MCF of gas (after fracture) and a rock pressure (before fracturing) of 3,875 psi in 48 hrs. By the end of the year a total of 29 gas wells and 8 dry holes had been drilled in the pool. The Helvetia Pool was discovered by the R. H. Kriner No. 1 on a separate fault block north of the Rockton Pool on the northwest flank of the Chestnut Ridge Anticline. This well (No. 14, Plate 7 and Table 11) by New York State Natural Gas Corporation found 10,645 MCF of gas after fracture with a rock pressure of 3,610 psi in 41 hrs. At the end of the year a total of 11 gas wells and 3 dry holes had been completed in the pool. The third discovery was the Sykesville Pool, discovered by the Burt Walls No. 1 (No. 96, Plate 7 and Table 11) of New York State Natural Gas Corporation with an open-flow of 1,061 MCF of gas at a rock pressure of 3,778 psi in 89 hours. This pool was discovered near the close of 1960 and the Walls was the only well drilled in the pool during the year. Other pools in the Punxsutawney-Driftwood Field in which development wells were drilled were the Rockton with 5 gas wells and 4 dry holes and the Boone Mt. with 4 gas wells and 3 dry holes. The 3 unsuccessful new field wildcat locations and records can be seen on Plate 7 and Table 11 as Nos. 71, 93, and 97. Well No. 92 on Plate 7, the Verstine & Kline No. 1 by F. C. Deemer, is a wildcat and has been shut down for a considerable time after reaching the Onondaga. The target of this wildcat is the Oriskany. The total cumulative production for the Punxsutawney-Driftwood Field as of January 1, 1961 was 374,500,000 MCF of gas.

Westmoreland County had 8 completions, 4 development gas wells, 2 dry holes, 1 successful new pool wildcat, and 1 unsuccessful new pool wildcat. The Pa. Game Commission Tract 42 D No. 3 well (No. 124, Plate 7 and Table 11) by Felmont Oil Corporation discovered the Baldwin Pool in the Johnstown Field. A total of 4 gas wells were drilled in this pool during the year. The largest initial open-flow was 9,115 MCF of gas (natural) with a rock pressure of 2,800 psi in 24 hrs. The Derry Pool had one successful completion. The cumulative production of the Johnstown Field was 5,787,912 MCF as of January 1, 1961.

In Fayette County 4 completions were made. East of the South Summit Pool the Earl Rahl No. 1 (No. 89 Plate 7 and Table 11) discovered the East Summit Pool, a separate fault block accumulation on the east flank of the Chestnut Ridge Anticline. The Summit Field produced 439,747 MCF during the year, making the cumulative figure 38,726,586 MCF of gas. In the Ohiopyle Field a producing gas well, an unsuccessful wildcat, and an unsuccessful outpost were drilled (Nos. 87, 88 and 86, Plate 7 and Table 11). By the year's end a transmission line had been connected to the wells in the field.

GENERALIZED COLUMNAR SECTION OF DEVONIAN ROCKS IN SOUTHERN LACKAWANNA COUNTY, PENNSYLVANIA

As Obtained in Transcontinental Production Company's Lawrence Richards No.1 Well, Ransom Township and G. B. Schreiber No.1 Well, Spring Brook Township

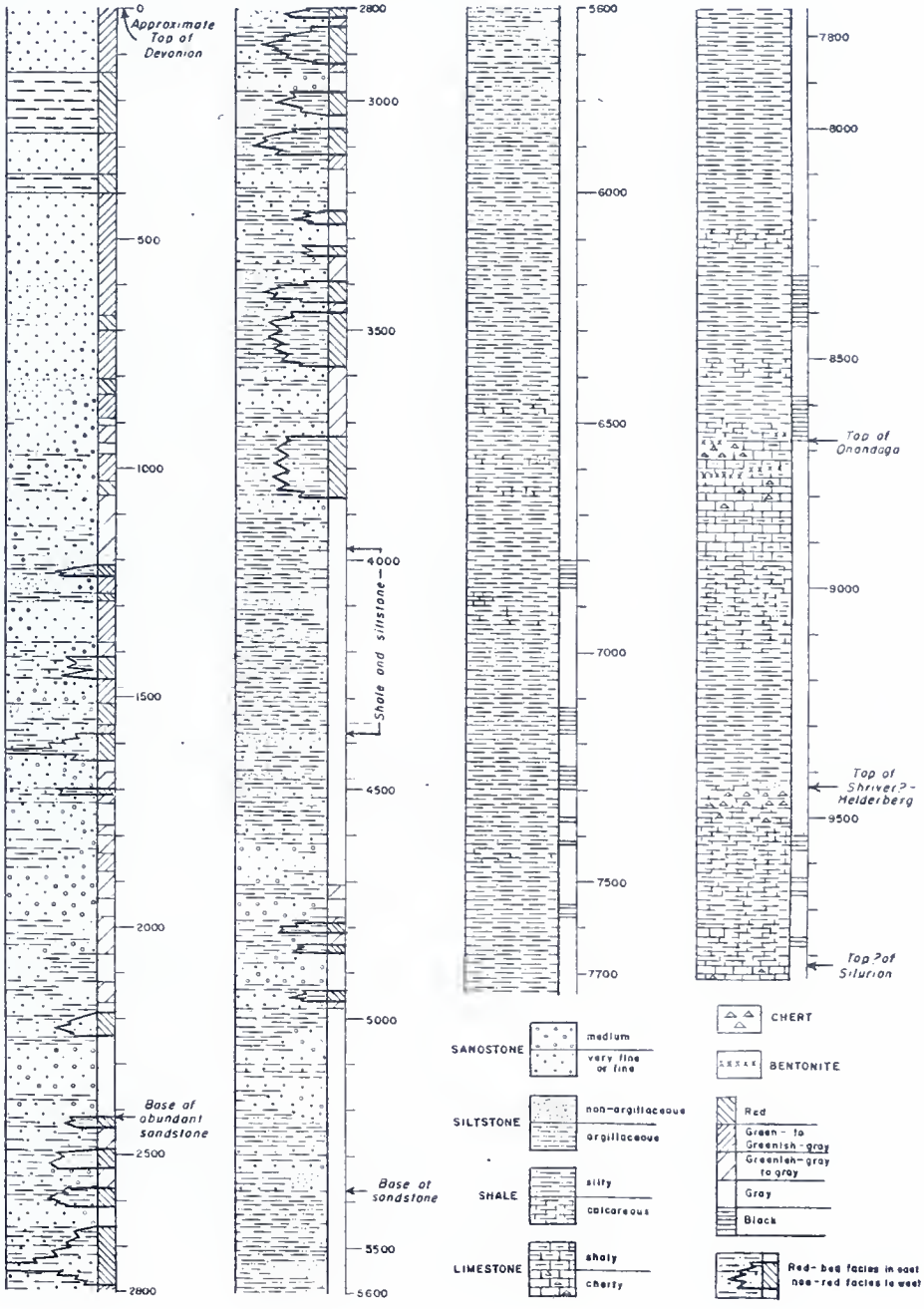


Plate 4

Somerset County had 8 completions. 3 gas wells were drilled in the Boswell Field. One of the wells,(an outpost) the Robert I. Snyder No. 1 by Peoples Natural Gas Company and Felmont Oil Corporation (No. 109, Plate 7 and Table 11) discovered the Snyder Pool. This field produced 1,536,152 MCF during the year, totaling 2,911,406 MCF at the end of the year. The Pa. Game Lands Tract 111 A, No. 1 by Manufacturers Light & Heat Company (No. 103, Plate 7 and Table 11) discovered the Rugg Pool in the Ohiopyle Field. This well had an initial production of 1,917 MCF of gas after fracture and a rock pressure of 3,370 psi. in 72 hrs. The other four wells drilled in this county were dry.

Bedford County with 4 completions had 3 of them in the Purcell Field, 2 of which were gas wells. The Robert Morris No. 1 (No. 5, Plate 7 and Table 11) was an unsuccessful new field wildcat. The wells in the Purcell Field had not been connected to a transmission line by the end of the year.

Plate 4 is a generalized columnar section in southern Lackawanna County of Devonian rocks as observed in the Richards No. 1 well, located west of the Lackawanna Coal Basin, and in the Schreiber No. 1 well to the east of the basin. Inclusion of the columnar section in this report is for the purpose of comparing the Devonian strata of northeastern Pennsylvania with strata of the same age in the northwestern part of the state.

The Upper Devonian sequence of the northeastern plateau is similar to that of northwestern Pennsylvania. Both sequences begin with red-beds near the top and grade downward into gray marine sandstones and shales, which in turn overlie dark-gray to black, silty shales which, with depth, gradually become calcareous. The strata range from thicknesses of 2,000 ft. to 4000 ft. in northwestern Pennsylvania to at least 6,900 to 7,000 ft. in southern Lackawanna County.

Because of the nomenclatural difficulties inherent in the terms "Catskill", "Chemung", and "Portage", the lack of agreement on terms to take their place, and because of the apparently unpredictable stratigraphic position of the base of the red-beds, the subdivision of the Upper Devonian rocks has not been attempted on this columnar section. It is hazardous, furthermore, to attempt correlation with the shallow oil and gas sands of western Pennsylvania which are of roughly equivalent age.

The Richards No. 1 well was completed with a gauged potential of 2500 MCF of gas from the Upper Devonian at approximately 3,976 ft. on the columnar section. The gas was found in the transition from the non-marine red-beds to gray, marine siltstones and shales.

The Tully Formation, marking the top of the Middle Devonian, may be represented by 25 ft. of limestone and calcareous shale at approximately 6,870 ft. on the columnar section. This designation is based on the position of the limestone between the black shales which may possibly be representative of the Burket Formation and the fossiliferous, dark, silty shales which may belong to the Moscow Formation of the Hamilton Group.

Table 8 Shallow-Sand Well Completions in Pennsylvania in 1960 *

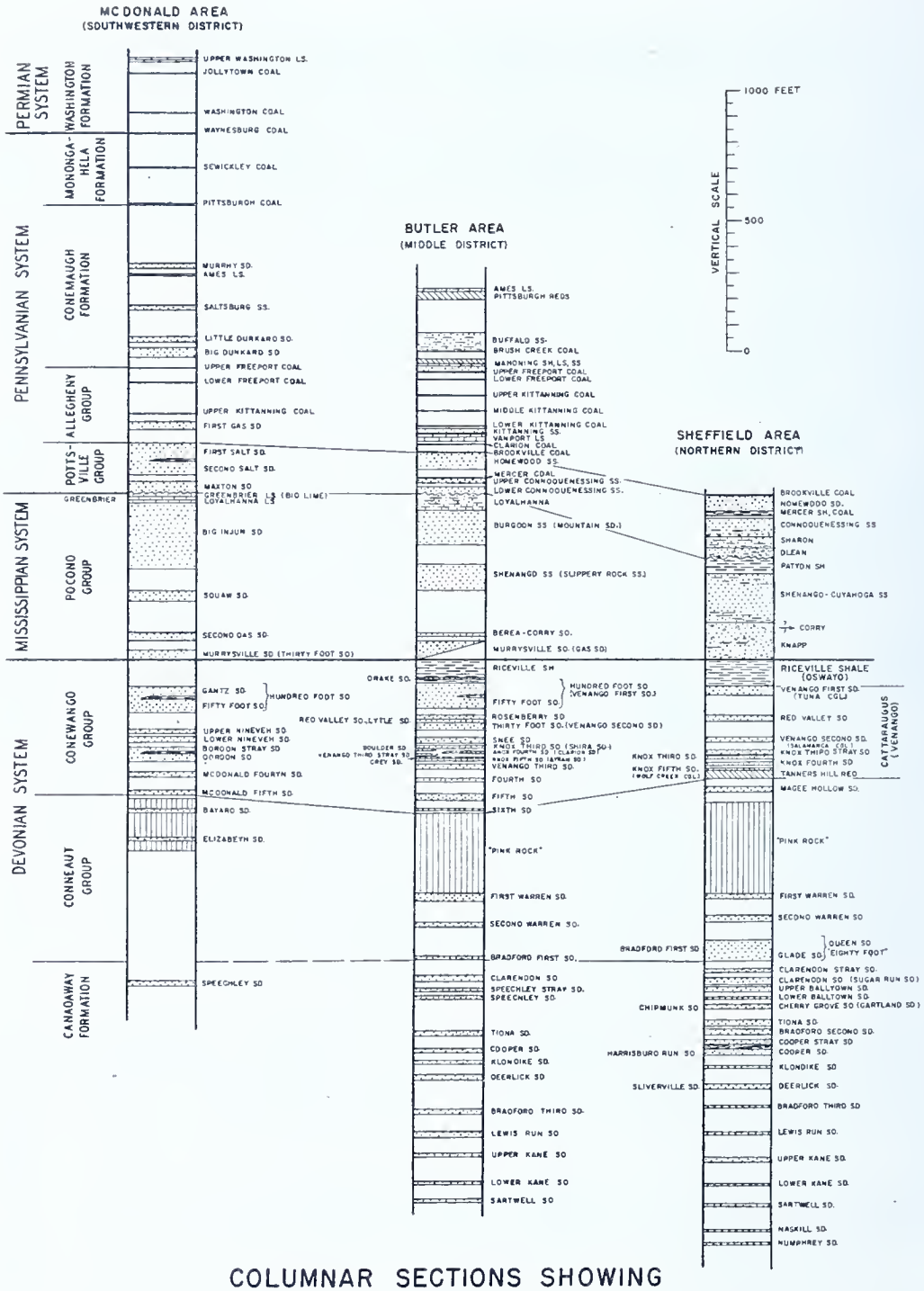
County	Total		Gas			Oil			Dry	
	No.of Wells	Aver. Total Depth (Feet)	No.of Wells	Aver.Init. Open Flow (M.cu.ft. per Day)	Aver. Total Depth (Feet)	No. of Wells	Aver.Init. Prod. (Bbls.per Day)	Aver. Total Depth (Feet)	No. of Wells	Aver. Total Depth (Feet)
Allegheny	3	2,588	1	20	2,246	-	-	-	2	2,759
Armstrong	60	2,997	54	707	3,005	-	-	-	6	2,926
Butler	3	1,723	1	385	1,802	1	1	1,701	1	1,667
Cambria	1	3,439	-	-	-	-	-	-	1	3,439
Clarion	32	2,314	28	420	2,495	2	1.25	948	2	1,147
Clearfield	1	1,298	-	-	-	-	-	-	1	1,298
Elk	2	2,546	2	25	2,546	-	-	-	-	-
Fayette	1	3,952	-	-	-	-	-	-	1	3,952
Forest	15	1,798	9	27	2,155	1	1	485	5	1,419
Greene	5	1,079	1	452	3,254	-	-	-	4	535
Indiana	27	3,463	25	426	3,420	-	-	-	2	3,506
Jefferson	19	2,958	13	172	2,972	2	1.15	2,331	4	3,223
McKean	4	2,410	-	-	-	-	-	-	4	2,410
Potter	1	2,250	-	-	-	-	-	-	1	2,250
Tioga	1	1,408	-	-	-	-	-	-	1	1,408
Venango	9	918	1	3	750	7	2.5	913	1	1,126
Warren	6	760	-	-	-	6	8.17	760	-	-
Washington	7	2,479	-	-	-	5	3.30	2,389	2	2,702
Westmoreland	49	3,362	40	917	3,298	-	-	-	9	3,642
Total	246	2,315	175	570	2,976	24	3.64	1,318	47	2,500

* Does not include wells drilled in connection with underground storage or secondary-recovery oil operations.

Table 9 Shallow-Sand Wells Deepened in Pennsylvania in 1960 *

County	Total		Gas			Oil			Dry	
	No.of Wells	Aver. Amount Deepened (Feet)	No. of Wells	Aver.Init. Open Flow (MCF Per Day)	Aver. Amount Deepened (Feet)	No.of Wells	Aver.Init. Prod. (Bbls.per Day)	Aver. Amount Deepened (Feet)	No.of Wells	Aver. Amount Deepened (Feet)
Armstrong	16	784	13	1,032	858	-	-	-	3	467
Clarion	1	2,516	-	-	-	-	-	-	1	2,516
Indiana	5	1,191	1	196	2,143	-	-	-	4	953
Jefferson	1	200	1	30	200	-	-	-	-	-
Washington	1	920	1	160	920	-	-	-	-	-
Westmoreland	5	1,360	5	670	1,360	-	-	-	-	-
Total	29	998	21	816	1,010	-	-	-	8	966

* Does not include wells drilled in connection with underground gas storage or secondary-recovery oil operations.



COLUMNAR SECTIONS SHOWING STRATIGRAPHIC POSITIONS OF OIL AND GAS SANDS OF WESTERN PENNSYLVANIA

JOHN M. BERGSTEN, 1957

Plate 5

The Onondaga Group of northeastern Pennsylvania is much thicker and more clastic than its counterpart in western Pennsylvania. In Lackawanna County the upper 250 ft. is composed of limestone and cherty limestone of the Buttermilk Falls or Selinsgrove Formations and the lower 500 ft. are dark shales of the Esopus or Needmore Formations.

The Lower Devonian in the columnar section is represented by 350 ft. of calcareous shale overlain by 50 ft. of chert and cherty limestone. The chert and cherty limestone is tentatively assigned to the Shriver Formation and the calcareous shale is considered to be Helderberg. The Ridgely Formation (Oriskany) is not present.

SHALLOW-SAND EXPLORATION AND DEVELOPMENT

An increase occurred in shallow-sand (Upper Devonian or younger) drilling in Pennsylvania during 1960 over that of 1959. In all, 745 shallow-sand wells were completed, as compared with 628 in 1959. Of these, 175 were gas wells, 24 were oil wells, 47 were dry holes, and 2 were drilled for underground storage of natural gas. 29 wells were deepened,- they were not related to secondary-recovery operations. Drilling in connection with secondary-recovery oil operations amounted to 497 new wells and 13 wells which were drilled deeper. The total footage for the new and deepened wells was 1,578,933 ft.

Shallow-sand well completions in western Pennsylvania exclusive of those drilled for underground gas storage or secondary oil recovery are shown in Table 8. The results of deepening 29 shallow-sand wells in 1960 are shown in Table 9. The stratigraphic positions of the Upper Devonian or younger oil and gas sands of western Pennsylvania, from the southwest to northeast along the trend of the producing belt shown in Plate 7, are illustrated in the 3 columnar sections appearing in Plate 5.

The 175 new gas wells had a total initial open-flow capacity of 100,694 MCFPD, as compared with the total initial open-flow capacity of 152,832 MCFPD for the 215 gas wells completed in 1959. The figures used for 1960 as well as for 1959 are those obtained after fracturing, where that method of well completion was employed. 143 of the 175 new gas wells were fractured; the combined initial open-flow capacities of the 143 gas wells was 97,859 MCFPD after fracturing, as compared with 4,263 MCFPD before fracturing. Of the 21 gas wells deepened, 19 were fractured. The combined initial open-flow capacity of these 19 wells was 16,956 MCFPD after fracturing, as compared with 451 MCFPD before fracturing. The 24 new oil wells completed in 1960 had a total production of 87.3 barrels of crude oil per day, as compared with the total production of 55.5 barrels per day for the 10 new wells completed in 1959.

Shallow-Sand Gas Developments

The primary targets for gas production in the shallow-gas fields, as in the previous 4 years, continued to be the Speechley, Balltown, and Bradford Third sands. Plate 6 shows the locations of the shallow gas wells

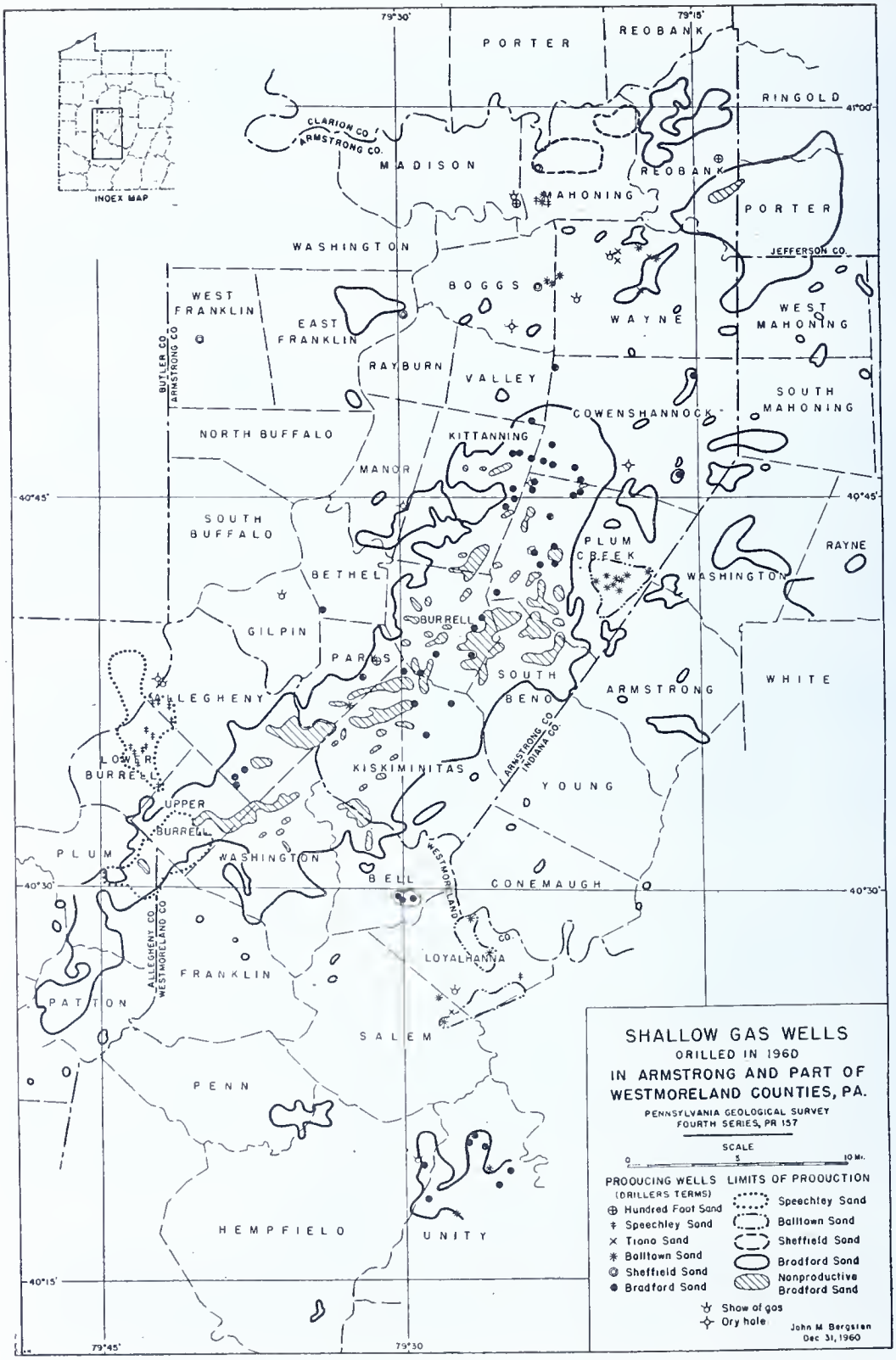

INDEX MAP
79°30'
79°15'
PORTER
REOBANK
RINGOLD
41°00'
CLARION CO.
ARMSTRONG CO.
MADISON
MAHONING
REOBANK
PORTER
WASHINGTON
JEFFERSON CO.
BOGGS
WEST FRANKLIN
EAST FRANKLIN
WAYNE
WEST MAHONING
BUTLER CO.
ARMSTRONG CO.
RAYBURN
VALLEY
SOUTH MAHONING
COWENSHANNOCK
NORTH BUFFALO
KITTANNING
MANOR
40°45'
SOUTH BUFFALO
PLUM CREEK
RAYNE
BETHEL
WASHINGTON
BURRELL
GILPIN
PARKS
SOUTH BEND
ARMSTRONG
WHITE
ALLEGHENY
ARMSTRONG CO.
INDIANA CO.
KISKIMINITAS
YOUNG
LOWER BURRELL
UPPER BURRELL
PLUM
WASHINGTON
BELL
CONEMAUGH
40°30'
WESTMORELAND CO.
ALLEGHENY CO.
WESTMORELAND CO.
LOYALHANNA
FRANKLIN
PATTON
SALEM
PENN
HEMPFIELD
UNITY
40°15'
79°45'
79°30
SHALLOW GAS WELLS
DRILLED IN 1960
IN ARMSTRONG AND PART OF
WESTMORELAND COUNTIES, PA.
PENNSYLVANIA GEOLOGICAL SURVEY
FOURTH SERIES, PR 157
SCALE
0
5
10 Mi.
PRODUCING WELLS
(DRILLERS TERMS)
Hundred Foot Sand
Speechley Sand
Trino Sand
Balltown Sand
Sheffield Sand
Bradford Sand
LIMITS OF PRODUCTION
Speechley Sand
Balltown Sand
Sheffield Sand
Bradford Sand
Nonproductive Bradford Sand
Show of gas
Dry hole
John M Bergstein
Dec 31, 1960

Plate 6

drilled in 1960 in Armstrong and part of Westmoreland Counties in Pennsylvania. Again, the greatest activity in the shallow-sand gas belt of western Pennsylvania was in Armstrong County. 54 new gas wells were completed in this county, of which 46 were fractured. Fracturing raised the combined initial open-flow capacities of the 46 new gas wells from 1,058 MCFPD to 37,176 MCFPD, an increase of 37 fold. Westmoreland County was second in the number of shallow-gas wells drilled in the State with 40 wells, Clarion County was next with 28 wells, Indiana County with 25 wells, and Jefferson County, 13 wells. Only 2 wells were drilled for underground storage of gas. They were drilled in the Donegal Storage Field, Washington County. 8 storage wells were redrilled during the year; 3 in Donegal; 3 in Bunola, Allegheny County; 1 in Heard, Washington County; and 1 in Pratt, Greene County. No new shallow-sand gas fields or pools were discovered in the State during the year.

Shallow-Sand Oil Developments

There was a total of 24 oil wells drilled in 7 counties during the year outside of the secondary-recovery projects. The greatest number of oil wells was drilled in Venango County where 7 wells averaging 2.5 bbls. per day were completed. Warren County was next in number of oil wells completed with 6 wells averaging 8.17 bbls. per day; Washington County with 5 oil wells averaging 3.3 bbls. per day. Four other counties had one or two oil wells completed during the year.

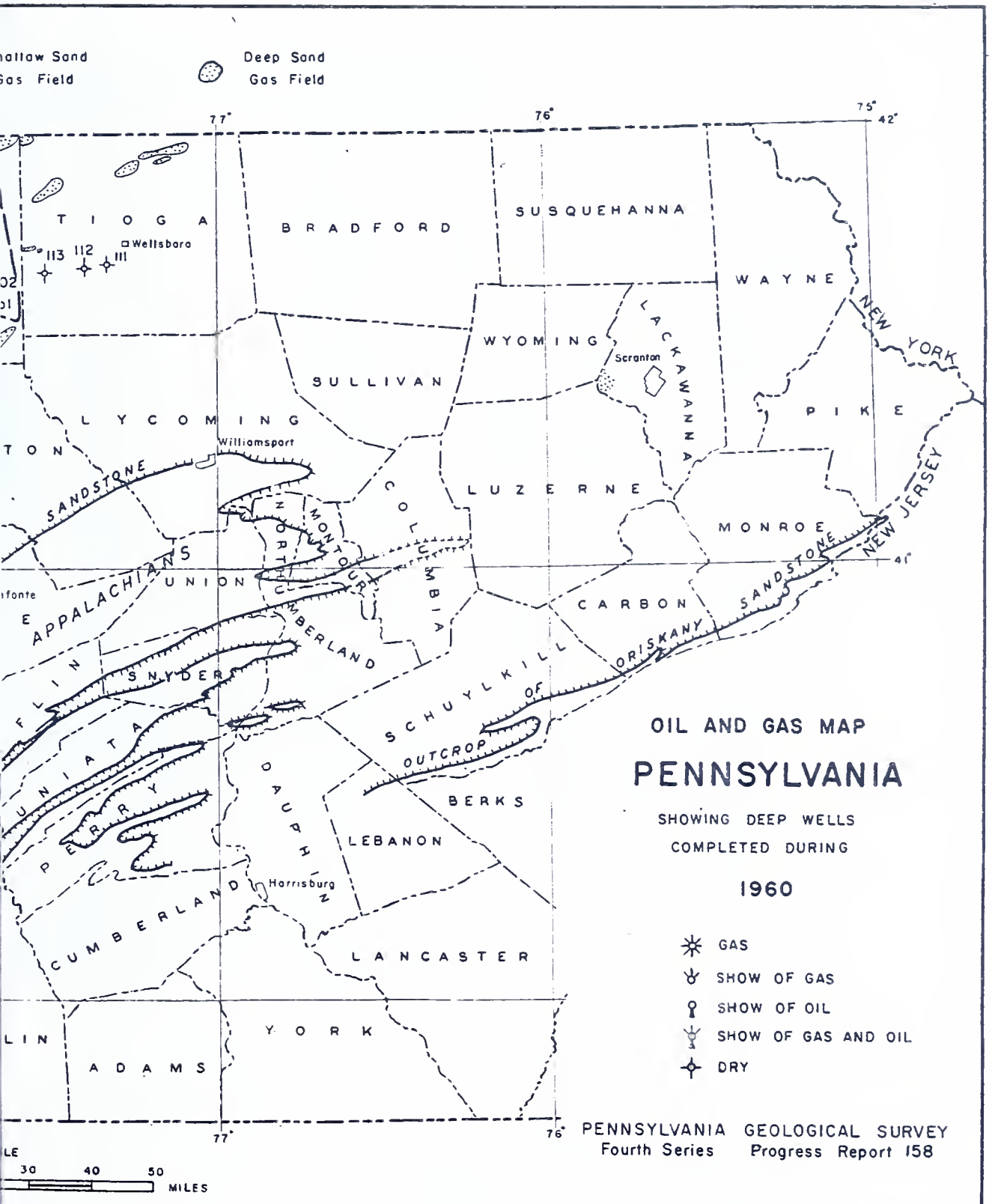
Oil production for the State averaged 16,236 bbls. per day as compared with 15,781 bbls. (a corrected figure) in 1959. Crude oil prices have continued to rise during the last 2 years. The price of crude oil at the close of 1960 was $4.80 per barrel in the Bradford District as compared with the past 30-year high of $5.00 per barrel in 1948. As a result of the increase, operators drilled more wells during the year than in 1959. Table 10 shows the price of crude oil during the year in the 3 marketing districts of Pennsylvania.

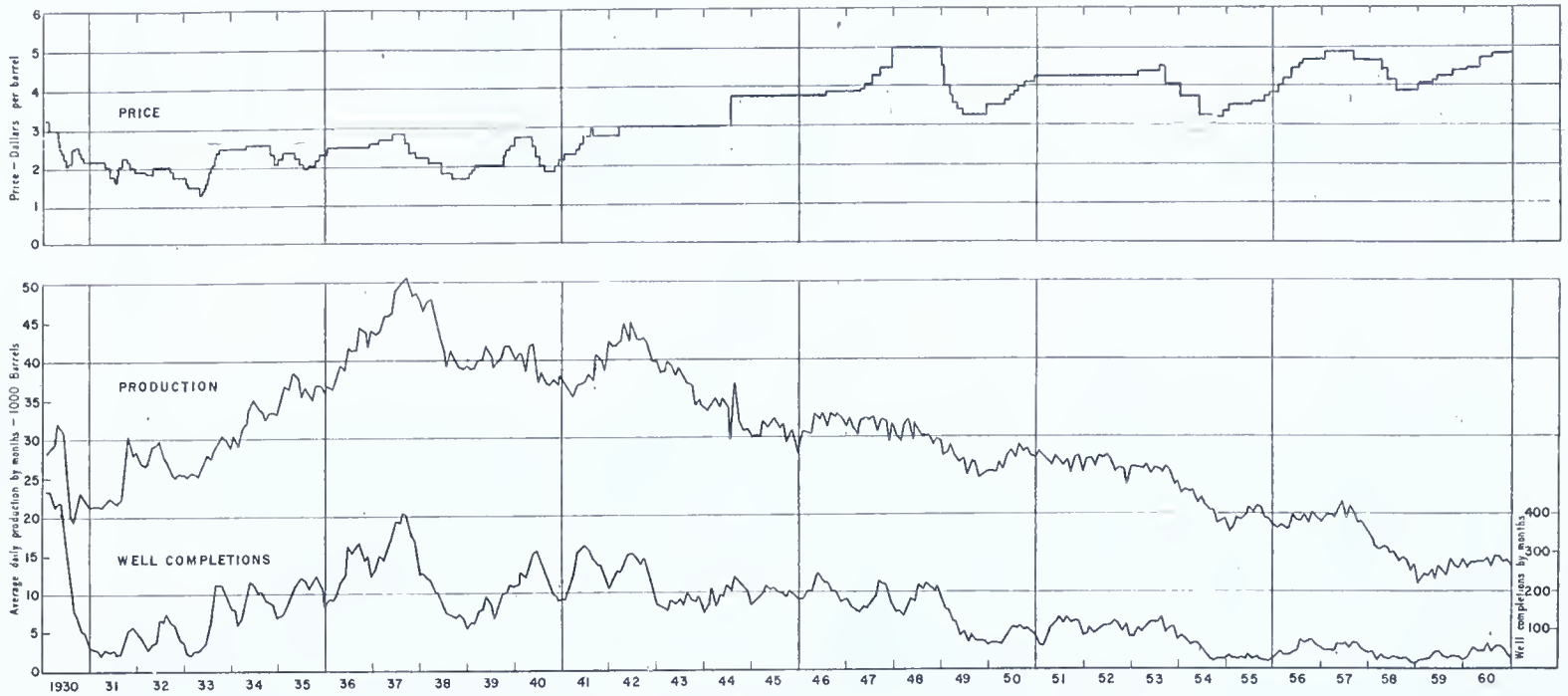
TABLE 10. PRICE PER BARREL OF CRUDE OIL, 1960

Date	Northern or Bradford District	Middle or Venango District	Southwestern District
Jan. 1	$ 4.40	$ 4.22	$ 3.95
Jan. 11	4.55	4.37	4.10
Apr. 25	4.70	4.52	4.25
Aug. 1	4.80	-	-

The Bradford Field includes the Bradford, Guffey, and Burning Well Pools. Statistics for this field show that 585 new wells were drilled in 1960 in connection with secondary-recovery operations, as compared with 365 in 1959, an increase of 60%. Due to the increased drilling, the production increased from a daily average of 13,263 bbls. in 1959 to 13,913 bbls. in 1960 or about 5%. About 86% of the Bradford Field is in Pennsylvania. In the Pennsylvania part of the field 466 new wells were completed and production amounted to 12,314 bbls. daily of crude oil, an amount which represents 76% of the total production in the State in 1960. Figure 2


LAKE ERIE
Erie
Burgess Field
Shallow Sand Oil Field
NEW YORK
ERIE
Wells 81,83,84 in Lexington Pool
Connectut Field
Tracy Pool
ORISKANY SANDSTONE ABSENT
Bradford Mallory Pool
Warren
WARREN
McKEAN
Port Allegany
CRAWFORD
Titusville
Kane
POTTER
Wells 100, 10 in Ole Bull
OHIO
FOREST
PROBABLY ABSENT
Wells 42,51-53 55,62,75 in Boone Mt. Pool
ELK
CAMERON
Oil City
Franklin
VENANGO
Wells 6,8-10,12,13,15, 17,20,22,25,27-37,39, 44-49,50,54,57,61, 64,94,97 in DuBois Pool
ORISKANY SANDSTONE
MERCER
CLARION
JEFFERSON
CLEARFIELD
Wells 43,56,58 63,65,66,73,74 in Rockton Pool
LAWRENCE
Sykesville Pool
Wells 7,11,14,16,21, 23,24,26,38,40, 41,59,60,67 in Helvetia Pool
BUTLER
Butler
ARMSTRONG
BEAVER
INDIANA
Nolo Field
CAMBRIA
OUTCROP OF ORISK
CENTRE
ALLEGHENY
Pittsburgh
Wells 122,123, 124,125 in Boldwin Pool
BLAIR
FOLDED
WEST VIRGINIA
WESTMORELAND
Beck Pool
Johnstown Field
WASHINGTON
Blair Pool
Wells 107,109,110 in Boswell Field
Washington
Kooser Pool
Well 87 in Ohiopyle Field
Bedford
Waynesburg
FAYETTE
SOMERSET
BEDFORD
FRANKLIN
Rugg Pool
East Summit
Pool
Wells 3,4 in Purcell Field
GREENE
WEST VIRGINIA
MARYLAND
0 10 20

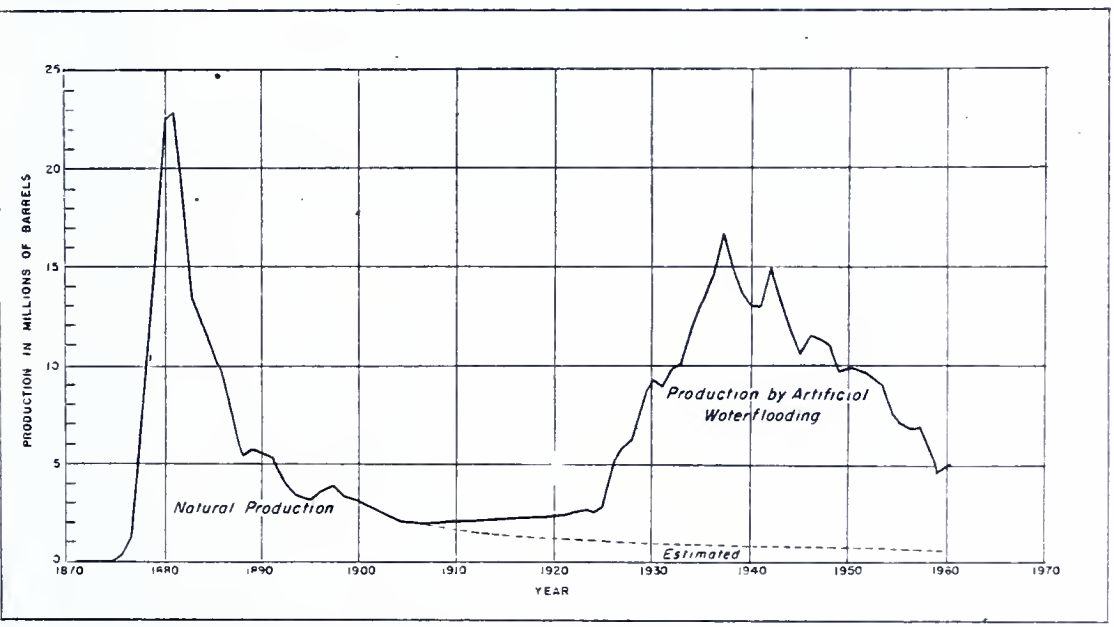

Shallow Sand Gas Field
Deep Sand Gas Field
77°
76°
75°
42°
41°
TIOGA
Wellsboro
113
112
111
BRADFORD
SUSQUEHANNA
WAYNE
WYOMING
Scranton
LACKAWANNA
NEW YORK
SULLIVAN
LYCOMING
Williamsport
PIKE
SANDSTONE
LUZERNE
MONROE
NEW JERSEY
APPALACHIANS
UNION
CARBON
SNYDER
SCHUYLKILL
ORISKANY
SANDSTONE
OUTCROP
OF
PERRY
BERKS
LEBANON
Harrisburg
CUMBERLAND
LANCASTER
YORK
ADAMS
30
40
50
MILES
OIL AND GAS MAP
PENNSYLVANIA
SHOWING DEEP WELLS
COMPLETED DURING
1960
GAS
SHOW OF GAS
SHOW OF OIL
SHOW OF GAS AND OIL
DRY
PENNSYLVANIA GEOLOGICAL SURVEY
Fourth Series Progress Report 158
COMPILED BY WILLIAM S. LYTLE AND VIRGINIA FAIRALL



CRUDE OIL PRICES, PRODUCTION AND WELL COMPLETIONS – BRADFORD FIELD

Figure 2

shows the crude oil prices, production and well completions in the Bradford Field. The annual crude oil production of the Bradford District is shown in Figure 3.



CRUDE OIL PRODUCTION CURVE OF THE BRADFORD DISTRICT, PA & N.Y.
(Music Mt. field excluded)

Figure 3

In other areas where secondary-recovery is practiced in the State, a total of 24 oil wells was drilled. In southwestern McKean County and eastern Warren County, 14 oil wells were completed in the Kane-Clarendon Area. In the Venango District of northern Venango County and adjacent parts of Warren County there were 10 new oil wells completed during the year, as compared with 3 new oil wells in 1959. Also 7 gas input wells were completed during the year; 4 in Warren County and 3 in Venango County.

The average daily oil production of the Middle and Southwestern Districts of Pennsylvania was 3,922 bbls. in 1960 as compared with 4,085 bbls. in 1959, a decline of about 4%. The Clough Field of central Forest County had 8 completions. Only one produced oil, 3 produced gas, and 4 were dry holes. The annual production of crude oil in Pennsylvania since 1859 is shown on Figure 4. No new shallow-sand oil fields or pools were discovered in Pennsylvania during the year.

SUMMARY

The oil and gas fields of Pennsylvania produced 5,942,000 bbls. of crude oil during the year, 67,000 bbls. of distillate and 119,671,000 MCF of gas. The proved recoverable reserves on December 31, 1960 were 107,632,000 bbls. (corrected) of crude oil, 2,110,000 bbls. of distillate, and 1,192,132,000 MCF of gas. The total reservoir capacity for storage of natural gas in Pennsylvania is 454,251,634 MCF. Figure 5 shows the annual production of natural gas in Pennsylvania from 1882 to the present.

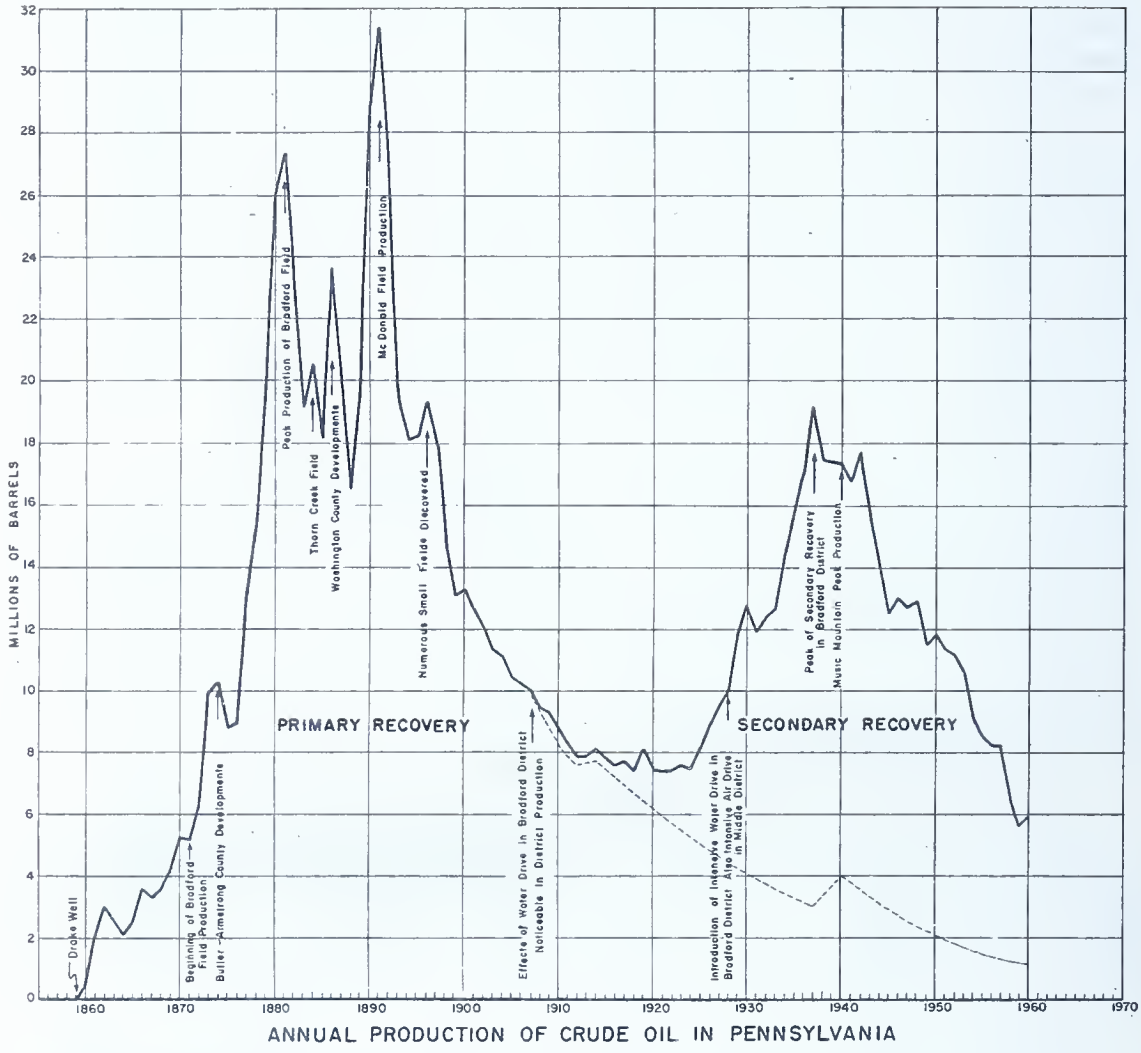
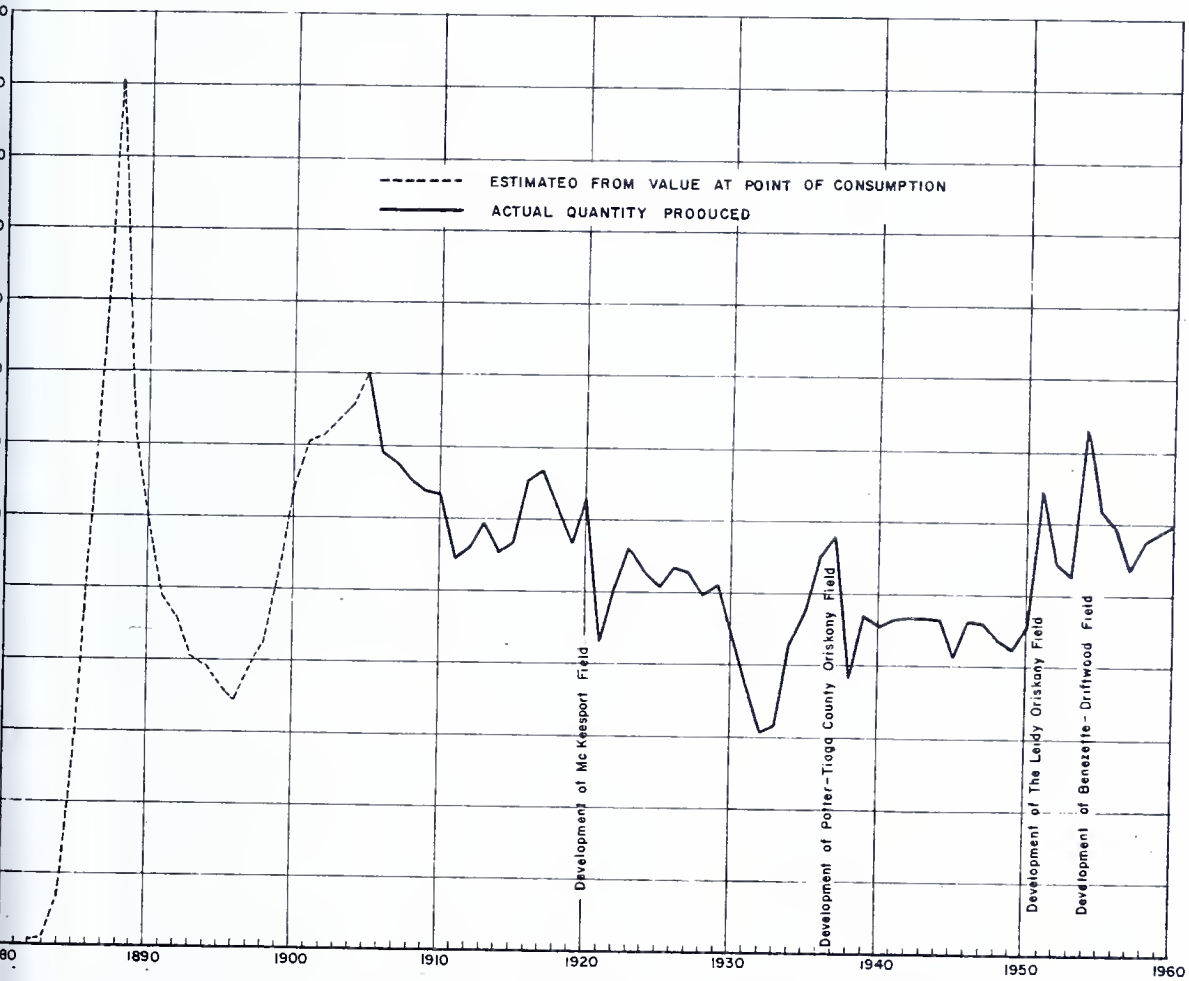


Figure 4

Current regulations pertaining to the oil and gas industry in Pennsylvania are Acts 225, 322, 352 and 570, and the rules and regulations of the Sanitary Water Board of Pennsylvania relating to the disposal of waste from oil and natural gas wells. During the year the oil and gas operators held a number of meetings in Harrisburg to draft an oil and gas conservation measure. The proposed bill will be submitted to the Legislature during the 1961 session. A bill was submitted at the beginning of the 1961 legislative session which would revise a section of act 570 so that specific additional information on certain oil and gas wells drilled within the State would be submitted to the Department of Internal Affairs.

The Pennsylvania Department of Forests and Waters during 1960 offered 7 tracts totaling 22,027 acres by the regular bidding procedure. Acceptable bids were received on 5 tracts, numbers 88 to 92, totaling 16,977 acres. The bids averaged $4.46 per acre with a royalty of $0.04 per MCF for gas and one-eighth royalty for oil. The bids ranged from $3.00 to $7.50 per acre. A total of 5 wells were drilled on lands leased by Forests and Waters, 3 were gas wells and 2 were dry holes. A policy has been adopted by the Department permitting seismic surveying across any State Forest land whether under lease or not as long as the survey does not conflict with other operations. The Department of Forests and Waters, the major landholder in the East Fork-Wharton Field has entered into a gas



ANNUAL PRODUCTION OF NATURAL GAS IN PENNSYLVANIA

Figure 5

storage agreement with the United Natural Gas Company of Oil City, Pennsylvania for the installation of storage facilities in the nearly depleted gas field.

The Pennsylvania Game Commission leased 7,154 acres of State Game Lands in 1960 for the exploration of oil and gas. The rental bids ranged from $5.00 to $36.78 per acre and royalties ranged from $0.04 to $0.0832 per MCF for gas and one-eighth royalty for oil. The highest rental bid was on Tract 26A in Blair and Bedford Counties.

The over all leasing in the State continued on a much smaller scale than the previous year except at the year's end when a flurry of leasing took place in Bedford, Blair, and Fulton Counties.

Out of 231 seismic crew weeks spent in the Appalachian Basin, 104 seismic crew weeks were logged in Pennsylvania. A number of geological field parties were active during the year. The airborne magnetometer survey of the Appalachian Basin area is nearing completion. This survey, by a private company, covering 129,500 sq. mi. will be completed in July 1961. The aeromagnetic maps will be offered to oil and gas companies for purchase.

Considerable more interest was shown in 1960 in the Medina play of northwestern Pennsylvania. The completion of a gas well in the Medina section with a natural initial open-flow of 6,200 MCFPD in Crawford County should add more impetus to exploration in this area during 1961. To date commercial quantities of gas in deeper horizons have been found only in the Onondaga chert-Oriskany Sandstone section (Middle and Lower Devonian) and in the Medina section (Lower Silurian). With the drilling of the Borst No. 1 in Erie County a show of gas was encountered in the Gatesburg sandstone (Upper Cambrian). Although this was not a commercial well, all other wells in the past that had reached this horizon in the State had found only highly concentrated saltwater. The Borst well should stimulate operators to drill more Gatesburg tests. A number of successes in rocks of Middle and Early Devonian age were realized along the Laurel Hill and Chestnut Ridge Anticlines during the year. This area should see an increase in activity during 1961. A large amount of acreage has been leased in the Valley and Ridge Province in the State. So far very little drilling has taken place in this province. Although rentals in this area are low, operators may soon want to test their holdings.

At the end of 1960 several wildcats were holding the interest of the operators. A Blair County well being drilled by Phillips Petroleum was cased and ready to perforate at 6,859-64 ft. This well later became a discovery well, producing from the Oriskany Sandstone within 3 miles of its outcrop. A new location had just been made in Warren County at the end of December. Several months later this well produced gas in commercial quantities from the Medina section. Three wells in eastern Pennsylvania are causing considerable interest. At the writing of this report the Hillbish in Northumberland County was drilling at 4821 ft; the Miller No. 1 in York County was drilling at 3,079 ft. in the Triassic with possibly another 7,000 ft. of Triassic to drill; the Harvey Leib No. 1 in York County was drilling in the Harpers Phyllite at 8,000 ft. after drilling through more than 7,000 ft. of Triassic sediments.

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TABLE 11

SUMMARIZED RECORD OF DEEP WELLS DRILLED

IN PENNSYLVANIA IN 1960

TABLE II SUMMARIZED RECORDS OF DEEP WELLS DRILLED IN PENNSYLVANIA IN 1960

SHEET 1

ELEVATIONS AND DEPTHS ARE IN FEET

COUNTY		Beaver	Bedford	Bedford	Bedford	Bedford	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER		1	2	3	4	5	6	7	8	9	10
NAME OF WELL		J&L Steel Corp Disposal Well 1	Herbert P Akers 1	Percy S Akers 1	Arlie Morral 1	Robert Morris 1	B & O R R 1	Josephine Carlson 1	City of DuBois 1	City of DuBois 2	City of DuBois 3
OPERATOR		Jones & Laughlin Steel Corp	NYSNG Corp N-777	NYSNG Corp N-747	NYSNG Corp N-761	NYSNG Corp N-760	Lee E Minter	Felmont Oil Corp	Lee E Minter	Lee E Minter	Lee E Minter
TOWNSHIP		Aliquippa Borough	Monroe	Monroe	Monroe	Monroe	City of DuBois	Brady	City of DuBois	City of DuBois	City of DuBois
QUADRANGLE		Sewickley 2	Clearville 8	Clearville 5	Clearville 6	Clearville 7	DuBois 20	DuBois 23	DuBois 15	DuBois 16	DuBois 18
LATITUDE		9300 ft N 40°35'	1300 ft S 39°50'	2300 ft N 39°50'	650 ft N 39°50'	12,100 ft N 39°50'	14,450 ft S 41°10'	650 ft N 41°05'	13,500 ft S 41°10'	13,500 ft S 41°10'	16,000 ft S 41°10'
LONGITUDE		3000 ft E 80°15'	6200 ft W 78°20'	4750 ft W 78°20'	5100 ft W 78°20'	7300 ft E 78°25'	4800 ft W 78°45'	550 ft W 78°45	700 ft W 78°45	2650 ft W 78°45'	3150 ft W 78°45'
DATE COMPLETED		9 - 12 - 60	12 - 5 - 60	4 - 8 - 60	6 - 1 - 60	11 - 9 - 60	8 - 6 - 60	11 - 26 - 60	8 - 5 - 60	8 - 3 - 60	8 - 2 - 60
ELEVATION		725 RT	1044 DF	1067 DF	1025 DF	1472 DF	1405 DF	1644 RT	1533	1405	1405 DF
TULLY		4978 - 5024					6420 -	6712 -	6655 -	6437 -	6424 -
ONONDAGA	LIMESTONE	5220 -	1st Onon 5265 - 2nd Onon 5585 -	4046 - 4243 - 4487 -	4450 -	6064 -	6969 -	7281 -	7235 -	6994 -	6982 -
	CHERT	5340					6989 -	7296 -	7252 -	7013 -	7000 -
ORISKANY		5388 - 5145 ft SW in 10 days	5786 -	4590 - Gas, 4656 - 4755	4548 - 4700	6190 - SG, 6225-6228 6316, 6355-60	7046 -	7351 -		7073 -	7077 -
HELDERBERG		5426 -	5945 -			6425 -					
SALINA											
GUELPH-LOCKPORT											
MEDINA	RED MEDINA (GRIMSBY)										
	WHITE MEDINA (WHIRLPOOL)										
QUEENSTON											
TOTAL DEPTH		5415	5960	4755	4712	6435	7067	7365	7254	7093	7097
DEEPEST FORMATION REACHED		Helderberg	Helderberg	Shriver	Shriver	Helderberg	Oriskany	Oriskany	Onondaga	Oriskany	Oriskany
RESULT		SG in chert Oriskany disposal for waste pickle liquor	Dry Abandoned	1857 Mcf gas AF RP 1905 psi 94 hrs	928 Mcf gas AF RP 1890 psi 38 hrs	14 Mcf gas and SW, AF RP 930 psi 72 hrs Abandoned	5363 Mcf gas natural RP 3782 psi 65 hrs	15,000 Mcf gas AF RP 2810 psi 72 hrs	Dry Abandoned	14,[illegible] Mcf gas natural RP 3548 psi 22 hrs	1262 Mcf gas AF RP(BF) 2110 psi 94 hrs Some SW

DF Derrick floor
RT Rotary table
Unmarked elevations are ground

TABLE II, SHEET 2

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER		11	12	13	14	15	16	17	18	19	20
NAME OF WELL		F.E. Delarme 1	A. E. Dick 1	Wm. Fairman (D.S. Hopkins, Agent) 2	R.H. Kriner 1	E.M. Larson 1	O.M. Monges 1	McIntosh Coal Co, No 1	McIntosh Coal Co No 2	McIntosh Coal Co No 3	Dallas Miller 1
OPERATOR		Felmont Oil Corp	Lee, E. Minter	NYSNG Corp N-758	NYSNG Corp N-752	Fairman Drilling Co	NYSNG Corp N-771	James Drilling Co	James Drilling Co.	James Drilling Co.	NYSNG Corp N-769
TOWNSHIP		Brady	Sandy	Sandy	Brady	Sandy	Brady	Sandy	Sandy	Sandy	Sandy
QUADRANGLE		Du Bois 24	Du Bois 7	Du Bois 9	Du Bois 5	Du Bois 4	Du Bois 12	Du Bois 2	Du Bois 6	Du Bois 8	Du Bois 10
LATITUDE		3650 ft. S 41°05'	6550 ft. S. 41°10'	10,950 ft. S 41°10'	9150 ft. S 41°05'	11,700 ft S. 41°10'	6200 ft. S. 41°05'	10,500 ft S. 41°10'	7400 ft S 41°10'	9200 ft S. 41°10'	8200 ft S 41°10'
LONGITUDE		2700 ft. W. 78°45'	1250 ft W. 78°45'	3050 ft W 78°45'	6550 ft W 78°45'	4900 ft W 78°45'	3800 ft W 78°45'	5200 ft W 78°45'	3800 ft W 78°45'	5400 ft. W. 78°45'	2500 ft W. 78°45'
DATE COMPLETED		11 - 26 - 60	5 - 14 - 60	6 - 6 - 60	5 - 11 - 60	4 - 30 - 60	7 - 12 - 60	3 - 12 - 60	5 - 29 - 60	6 - 10 - 60	6 - 30 - 60
ELEVATION		1550 RT	1633	1441 DF	1454 DF	1536 DF	1548 DF	1567	1561 DF	1613	1597 DF
TULLY		6585 -	6618 -	6449 -	6565 -	6585 -	6604 -	6620 -	6660 -	6710 -	6606 -
ONONDAGA	LIMESTONE	7160 -	7176 -	7006 -	7143 -	7161 -	7179 -	7162 -	7214 -	7252 -	7149 -
	CHERT	7175 -	7196 -	7019 -	7157 -	7177 -	7193 -	7179 -	7229 -	7268 -	7166 -
ORISKANY		7232 - Gas at 7240	7260 -	7080 -	7211 - Gas at 7215	7239 -	7249 -	7245 -	7294 - 7316 Gas at 7296	7336 -	7232 - Gas, 7232-38
HELDERBERG		7265 -		7107 -	7241 -		7280 -				7259 -
SALINA											
GUELPH-LOCKPORT											
MEDINA	RED MEDINA (GRIMSBY)										
	WHITE MEDINA (WHIRLPOOL)										
QUEENSTON											
TOTAL DEPTH		7265	7280	7109	7242	7259	7281	7264	7318	7339	7260
DEEPEST FORMATION REACHED		Helderberg	Oriskany	Helderberg	Helderberg	Oriskany	Helderberg	Oriskany	Helderberg	Oriskany	Helderberg
RESULT		7500 Mcf gas AF RP 2670 psi 54 hrs	6455 Mcf gas AF RP (BF) 3800 psi 44 hrs	21,852 Mcf gas AF RP 3769 psi 12 days	10,645 Mcf gas AF RP 3610 psi 41 hrs Discovery Well Helvetia Pool	6903 Mcf gas AF RP 3740 psi 63 hrs.	6698 Mcf gas natural RP 3575 psi 45 hrs	5620 Mcf gas AF RP 3750 psi 48 hrs	450 cu ft gas AF RP 2450 psi Abandoned	Dry Abandoned	7774 Mcf gas AF RP 3687 psi 7 days

TABLE II SHEET 3

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER	21	22	23	24	25	26	27	28	29	30
NAME OF WELL	Old Town Beagle Club 1	HS Reasinger 1	John E Rishell 1	R & P Coal Co 1	David Williams 1	William Barr 1	City of DuBois 1	City of DuBois 2	Deemer-Green Glen 2	Deemer-Green Glen 3
OPERATOR	Fairman Drilling Co	NYSNG Corp N-781	NYSNG Corp N-779	NYSNG Corp N-768	James Drilling Co	NYSNG Corp N-794	Kewanee Oil Co	Kewanee Oil Co	Felmont Oil Corp	Felmont Oil Corp
TOWNSHIP	Sandy	Sandy	Brady	Brady	Sandy	Brady	City of DuBois	City of DuBois	Sandy	Sandy
QUADRANGLE	DuBois 19	DuBois 22	DuBois 14	DuBois 11	DuBois 3	Penfield 269	Penfield 254	Penfield 253	Penfield 240	Penfield 247
LATITUDE	4700 ft S 41°05'	17,000 ft S 41°10'	4250 ft S 41°05'	10,750 ft S 41°05'	8700 ft S 41°10	2900 ft N 41°05'	11,770 ft S 41°10'	16,500 ft S 41°10'	1000 ft N 41° 10	5400 ft S 41° 10'
LONGITUDE	5850 ft W 78°45'	10,450 ft W 78°45'	1450 ft W 78°45	8500 ft W 78°45	800 ft W 78°45'	5200 ft E 78°45	2500 ft E 78°45	240 ft E 78°45'	9100 ft W 78°40'	2500 ft E 78°45'
DATE COMPLETED	9 - 7 - 60	12 - 1 - 60	8 - 1 - 60	9 - 27 - 60	3 - 26 - 60	11 - 4 - 60	5 - 14 - 60	6 - 3 - 60	2 - 12 - 60	4 - 27 - 60
ELEVATION	1431	1575 DF	1592 DF	1408 DF	1548 DF	1681 DF	1500 DF	1408 DF	1688 RT	1583 RT
TULLY	6558 -	6647 -	6611 -	6561 -	6540 -	6695 -	6568 -	6515 - 6615	6786 -	6640 -
ONONDAGA LIMESTONE	7134 -	7206 -	7198 -	7171 -	7120 -	7337 -	7111 -	7059 -	7457 -	7214 -
ONONDAGA CHERT	7150 -	7224 -	7214 -	7186 -	7142 -	7353 -	7127 -	7069 -	7464 -	7230 -
ORISKANY	7209 -	7284 -	7260 - Gas, 7268-80	7255 - SG at 7261	7217 -	7404 -	7183 - Gas at 7185	7131 - SW at 7138	7536 -	7295 - Gas, 7298-7305
HELDERBERG		7311 -	7297 -			7435 -				
SALINA										
GUELPH-LOCKPORT										
MEDINA RED MEDINA (GRIMSBY)										
MEDINA WHITE MEDINA (WHIRLPOOL)										
QUEENSTON										
TOTAL DEPTH	7225	7314	7298	7270	7235	7437	7[illegible]	7140	7565	7325
DEEPEST FORMATION REACHED	Oriskany	Helderberg	Helderberg	Oriskany	Oriskany	Helderberg	Oriskany	Oriskany	Oriskany	Oriskany
RESULT	1958 Mcf gas Some SW, AF RP, BF 3240 psi 4½ hrs	2[illegible] Mcf gas 35 BPH SW AF RP 2850 psi 47 hrs Abandoned	710 Mcf gas natural RP 3435 psi 37 hrs	525 Mcf gas Salt water 4240 ft Abandoned	198 Mcf gas + RP 3750 psi 2 hrs	5382 Mcf gas AF 3,[illegible] Mcf/min RP, BF 3132 psi 72 hrs	[illegible],044 Mcf gas AF RP 3500 psi 20 hrs	Dry Abandoned	SW at 7543 Abandoned	20,000 Mcf gas AF RP 3[illegible] psi [illegible] hrs

TABLE II SHEET 4

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER	31	32	33	34	35	36	37	38	39	40
NAME OF WELL	Deemer-Green Glen 4	Deemer-Green Glen 5	Deemer-Green Glen 6	Deemer Green Glen 7	Deemer-Green Glen 8	Deemer-Green Glen 10	Deemer-Green Glen 11	Herman L Delp 1	DuBois Country Club, No 3	DuBois Nat Bank (H.E. Ginter Est.) 1
OPERATOR	Felmont Oil Corp	Felmont Oil Corp	Felmont Oil Corp	Felmont Oil Corp	Felmont Oil Corp	Felmont Oil Corp	Felmont Oil Corp	NYSNG Corp N-791	S W Jack Drilling Co	NYSNG Corp N-796
TOWNSHIP	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Brady	Sandy	Brady
QUADRANGLE	Penfield 246	Penfield 245	Penfield 252	Penfield 251	Penfield 260	Penfield 262	Penfield 265	Penfield 268	Renfield 259	Penfield 272
LATITUDE	4750 ft S 41°10'	2350 ft S 41°10'	6700 ft S 41°10'	8700 ft S 41°10'	1300 ft S 41°10'	10,000 ft S 41°10'	5000 ft S 41°10'	1450 ft N 41°05	11,600 ft S 41°10	800 ft N 41°05'
LONGITUDE	4500 ft E 78°45'	14,600 ft W 78°40'	3850 ft E 78°45'	2500 ft E 78°45'	6800 ft E 78°45	1900 ft E 78°45'	7750 ft E 78°45'	3100 ft E 78°45'	500 ft E 78°45'	600 ft E 78°45'
DATE COMPLETED	4 - 2 - 60	3 - 18 - 60	5 - 14 - 60	5 - 14 - 60	6 - 30 - 60	7 - 28 - 60	8 - 18 - 60	10 - 7 - 60	6 - 19 - 60	12 - 23 - 60
ELEVATION	1611 RT	1678 RT	1625 RT	1511 RT	1705 RT	1545 RT	1636 RT	1569 DF	1443 DF	1655 DF
TULLY	6568 -	6660 -	6595 -	6510 -	6677 -	6539 - 6640	6656 -	6568 -	6495	6689 -
ONONDAGA LIMESTONE	7133 -	7210 -	7139 -	7053 -	7238 -	7086 -	7229 -	7133 -	7025 -	7248 -
ONONDAGA CHERT	7144 -	7223 -	7147 -	7067 -	7247 -	7106 -	7244 -	7144 -	7040 -	7266 -
ORISKANY	7212 -	7294 -	7217 -	7135	7317 - SG at 7318	7169 - SG at 7170	7306 -	7198 -	7120 -	7314 -
HELDERBERG	7243 -		7248 -	7165 -	7348 -			7226 -		7343 -
SALINA										
GUELPH-LOCKPORT										
MEDINA RED MEDINA (GRIMSBY)										
MEDINA WHITE MEDINA (WHIRLPOOL)										
QUEENSTON										
TOTAL DEPTH	7244	7309	7250	7166	7349	7201	7336	7227	7126	7344
DEEPEST FORMATION REACHED	Helderberg	Oriskany	Helderberg	Helderberg	Helderberg	Oriskany	Oriskany	Helderberg	Oriskany	Helderberg
RESULT	10,000 Mcf gas natural RP 3044 psi 4 1/2 days	7000 Mcf gas AF RP(BF) 3750 psi 5 days	17,000 Mcf gas AF RP(BF) 3567 psi 41 hrs	20,000 Mcf gas AF RP(BF) 3538 psi 4 days	15,200 Mcf gas AF RP(BF) 3208 psi 69 hrs	15,000 Mcf gas AF RP(BF) 2182 psi 105 hrs	6500 Mcf gas AF RP 2414 psi 3 weeks	11,614 Mcf gas natural RP 3310 psi 36 hrs	10,000 Mcf gas natural RP 3250 psi +8 hrs	10,504 Mcf gas AF RP 2340 psi 70 hrs

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER	41	42	43	44	45	46	47	48	49	50
NAME OF WELL	Walter Dunlap 1	Amos Duffry 1	Green Glen 1(c)	Green Glen Wt3594, 1-1	Green Glen Wt3594, 1-2	Green Glen Wt3584, 1-3	Green Glen 4	Green Glen 5	Green Glen (Wt3584) 1	Green Glen (Wt3584) 2
OPERATOR	N.Y.S.N.G. Corp N-798	Lee E Minter	Fairman Drilling Co	S.W. Jack Drilling Co	S.W. Jack Drilling Co	S.W. Jack Drilling Co	S.W. Jack Drilling Co	S.W. Jack Drilling Co	Lee E. Minter	Lee E. Minter
TOWNSHIP	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
QUADRANGLE	Penfield 271	Penfield 242	Penfield 261	Penfield 232	Penfield 237	Penfield 239	Penfield 256	Penfield 258	Penfield 249	Penfield 250
LATITUDE	4400 ft N 41°05'	1800 ft N 41°10'	8200 ft N 41°05'	3100 ft S 41°10'	4100 ft S 41°10'	4800 ft S 41°10'	2900 ft S 41°10'	50 ft N 41°40'	7750 ft S 41°10'	9900 ft S 41°10'
LONGITUDE	7600 ft E 78°45'	7300 ft W 78°40'	4950 ft W 78°40'	7500 ft E 78°45'	6100 ft E 78°45'	3600 ft E 78°45'	4200 ft E 78°45'	2700 ft E 78°45'	2700 ft E 78°45'	1100 ft E 78°45'
DATE COMPLETED	12-18-60	2-12-60	7-6-60	1-6-60	2-28-60	2-28-60	5-7-60	5-29-60	3-25-60	4-11-60
ELEVATION	1599	1759	1471	1683 DF	1610 DF	1657 DF	1714 DF	1637 DF	1540 DF	1492 DF
TULLY	6590 -	6925 -	6417 -	6644 -	6572 -	6612 -	6650 -	6650	6528 -	6475 -
ONONDAGA LIMESTONE	7168 -	7512 -	7023 -	7214 -	7125 -	7179 -	7214 -	7194 -	7084 -	7027 -
ONONDAGA CHERT	7185 -	7529 -	7037 -	7274 -	7185 -	7195 -	7230 -	7220 -	7102 -	7049 -
ORISKANY	7240 -	7589 -	7092 -	7318 -	7232 -	7253 -	7297 -	7297 -	7167 -	7107 -
HELDERBERG	7269 -								7199 -	
SALINA										
GUELPH-LOCKPORT										
MEDINA RED MEDINA (GRIMSBY)										
MEDINA WHITE MEDINA (WHIRLPOOL)										
QUEENSTON										
TOTAL DEPTH	7290	7610	7112	7320	7238	7266	7313	7313	7200	7127
DEEPEST FORMATION REACHED	Medina (Red)	Oriskany	Oriskany	Oriskany	Oriskany	Oriskany	Oriskany	Oriskany	Helderberg	Oriskany
RESULT	19,512 Mcf gas AF RP(BF) 2309 psi 24 hr	Dry Abandoned	534 Mcf gas AF RP(BF) 1400 psi 25 hr	30,370 Mcf gas AF RP(BF) 3875 psi 48 hrs Discovery Well Dubois Pool	3,272 Mcf gas AF RP(BF) 3875 psi 14 hrs	23,000 Mcf gas natural RP 3900 psi 48 hrs	15,000 Mcf gas AF RP(BF) 2875 psi 48 hrs	Dry Abandoned	14,000 Mcf gas AF RP 3880 psi	25,000 Mcf gas natural RP 3880 psi 48 hrs

TABLE II SHEET 6

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield
MAP NUMBER		51	52	53	54	55	56	57	58	59	60
NAME OF WELL		Green Glen 1	Green Glen 2	Green Glen 1	Flo. M Hyatt 1	Alvin T Holgren 1	M D Luchuck 2	Elwood Minns 1	A J Palumbo 10	John R Potter 1	John R Potter 2
OPERATOR		NYSNG Corp N-746	NYSNG Corp N-751	Rockton Drilling Co	James Drilling Co	NYSNG Corp N-750	James Drilling Co	Fairman Drilling Co.	NYSNG Corp N-743	NYSNG Corp N-782	NYSNG Corp N-790
TOWNSHIP		Sandy	Sandy	Sandy	Sandy	Sandy	Huston	Sandy	Huston	Brady	Brady
QUADRANGLE		Penfield 231	Penfield 241	Penfield 264	Penfield 257	Penfield 243	Penfield 244	Penfield 238	Penfield 234	Penfield 266	Penfield 267
LATITUDE		5750 ft N 41°10'	8400 ft N 41°10'	4700 ft N. 41°10'	8600 ft. S 41°10'	4600 ft. N 41°10'	6100 ft. S 41°15'	6250 ft S 41°10'	2700 ft. S. 41°15'	2200 ft S 41°05'	2000 ft S 41°05'
LONGITUDE		550 ft W 78°40'	1000 ft W 78°40'	5200 ft W. 78°40'	800 ft E 78°45'	3300 ft W 78°40'	12,500 ft W. 78°30'	2200 ft E. 78°45'	7800 ft W. 78°30'	1000 ft E 78°45'	200 ft E. 78°45'
DATE COMPLETED		1 - 15 - 60	3 - 10 - 60	8 - 19 - 60	4 - 14 - 60	6 - 14 - 60	3 - 22 - 60	3 - 8 - 60	2 - 3 - 60	10 - 13 - 60	9 - 29 - 60
ELEVATION		1585 DF	1581 DF	1691	1545 DF	1792 DF	1197	1575 DF	1197	1628	1653 DF
TULLY		6677-	6610 -	6947 -	6544 -	6943 -	6225 -	6562 -	6149 -	6638 -	6642 -
ONONDAGA	LIMESTONE	7235 -	7177 -	7568 -	7110 -	7520 -	6852 -	7116 -	6753 -	7616 -	7219 -
	CHERT	7254 -	7191 -	7581 -	7125 -	7537 -	6864 -	7131 -	6773 -	7635 -	7233 -
ORISKANY		7305 - Gas, 7308 - 12	7245 - Gas, 7247 - 50		7199 -	7588 -	6918 -	7194 -	6811 -		7288 - Gas, 7291 - 7303
HELDERBERG									6842 -		7317 -
SALINA											
GUELPH - LOCKPORT											
MEDINA	RED MEDINA (GRIMSBY)										
	WHITE MEDINA (WHIRLPOOL)										
QUEENSTON											
TOTAL DEPTH		7320	7275	7582	7211	7600	6933	7212	6843	763 -	7318
DEEPEST FORMATION REACHED		Oriskany	Oriskany	Onondaga	Oriskany	Oriskany	Oriskany	Oriskany	Helderberg	Onondaga	Helderberg
RESULT		6676 Mcf gas AF RP(BF) 3760 psi 8 days	1762 Mcf gas AF RP 3260 psi 90 hrs.	Dry Abandoned	8000 Mcf gas natural RP 3840 psi 24 hrs	12 Mcf gas Unable to guage AF Abandoned	700 Mcf gas & SW AF RP 2100 psi 42 hrs. Abandoned	15,750 Mcf gas AF RP(BF) 3835 psi 79 hrs	2755 Mcf gas AF RP 3260 psi 40 hrs	Dry Abandoned	30,370 Mcf gas AF RP 3293 psi 4 days

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Clearfield	Crawford	Crawford	Crawford
MAP NUMBER		62	62	63	64	65	66	67	68	69	70
NAME OF WELL		Alice Ross Trustee, 1	Beatrice Sellers 1	Cath. A. Sherry 1	M.E. Trude 1	N.C. Utzinger 1	Warrant 5067 (New Showmut) 2	Geo Whitmore 1	J. Lehman 1	Lewis Sergent 1	Shadeland 2
OPERATOR		Devonian Gas & Oil Co	Fairman Drilling Co	James Drilling Co.	Fairman Drilling Co	N.Y.S.N.G. Corp N-688	Devonian Gas & Oil Co	S.W. Jack Drilling Co.	George Hall et al	Pa Gas Co. and Felmont Oil Corp.	M. Trico (Imperial Oil Co.)
TOWNSHIP		Sandy	Huston	Huston	Sandy	Brady	Huston	Sandy	Spring	Beaver	Spring
QUADRANGLE		Penfield 248	Penfield 233	Penfield 263	Penfield 255	Penfield 235	Penfield 230	Penfield 270	Girard 43	Girard 40	Girard 35
LATITUDE		5500 ft. S 41°10'	3400 ft S 41°15	2300 ft. S. 41°15'	7650 ft. S 41°10'	5200 ft S. 41°05'	10,800 ft. S 41°15'	3300 ft. N 41°05'	11,000 ft. N 41°45'	1700 ft. N 41°50'	6500 ft. S 41°50'
LONGITUDE		500 ft. E. 78°45'	12,400 ft. W 78°30'	5200 ft. W. 78°30'	700 ft. E 78°45'	5100 ft. E 78°45'	9300 ft. W 78°30'	2600 ft. E. 78°45'	8450 ft. W 80°20'	850 ft. W. 80°25'	7800 ft. E 80°25'
DATE COMPLETED		4-16-60	1-26-60	7-7-60	6-11-60	2-12-60	1-9-60	11-16-60	9-1-60	8-8-60	3-1-60
ELEVATION		1720 DF	1211 DF	1317 DF	1545 DF	1690 DF	1460	1602 DF	1002 DF	905	876 DF
TULLY		6684 - 6790	6205 -	6180 -	6526	6686 -	6414 -	6715 - 6810	2100 - 2125	1880 - 1930	1906 - 1944
ONONDAGA	LIMESTONE	7240 -	6809 -	6808 -	7074 -	7286 -	7038 -	7295	2260 -	2057 -	2070 -
	CHERT	7261 -	6824 -	6821 -	7091 -	7299 -	7051 -	7311 -			
ORISKANY		7324 -	6864 -	6869 -	7166 -	7354 - Gas, 7355 - 59	7103 -	7365 -	2468 - 2474 1000 ft SW at 2468	2318 - 2326 SW at 2324	2316 - 2323 SW at 2323
HELDERBERG						7377 -		7390 -	Bass Island. 2474 -		
SALINA									Salt, 2729 - 2754 2850 -	1st salt, 2545 -	1st salt, 2670 -
GUELPH - LOCKPORT									Black water at 3315	Salt water at 3066	SG, 3097 - 3107
MEDINA	RED MEDINA (GRIMSBY)								3536 - Gas 3580, 3589 3596 - 3600	3302 - 3369 Gas, 3317 - 3329 3349 - 3352	3359 - SG
	WHITE MEDINA (WHIRLPOOL)									3445 - 3455	
QUEENSTON										3455 -	
TOTAL DEPTH		7344	6884	6884	7188	7378	7126	7415	3600	3463	3488
DEEPEST FORMATION REACHED		Oriskany	Oriskany	Oriskany	Oriskany	Helderberg	Oriskany	Helderberg	Medina	Queenston	Grimsby
RESULT		10,000 Mcf gas AF RP 3720 psi 48 hrs	4750 Mcf gas AF RP 2550 psi 72 hrs	9,89 Mcf gas after 3rd frac RP 3410 psi 18 hrs	10,250 Mcf gas AF RP BF 1305 psi 16½ hrs	1012 Mcf gas AF RP, SI 1575 psi 38 hrs	4125 Mcf gas AF RP, SI 1870 psi 31 hrs	Show of gas & salt water Abandoned	6200 Mcf gas natural RP 1100 psi 24 hrs	7½ Mcf gas RP 145 psi, 13 hrs 8 gals oil and 55 gals SW, 42 hrs Abandoned	Show of gas Abandoned

TABLE II SHEET 8

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Elk	Elk	Elk	Elk	Elk	Erie	Erie	Erie	Erie	Erie
MAP NUMBER		71	72	73	74	75	76	77	78	79	80
NAME OF WELL		A.J. Palumbo II	Pa Tract 84 1	Winifred Smith 1	John W. Thomas 1	A.J. Palumbo II	Barnes 1	Borst 1	C Ebner 1	R Hammer 1	Huston 2
OPERATOR		NYSNG Corp. N-799	Shell Oil Co.	James Drilling Co	Harry Brunt et al	NYSNG Corp N-744	Worldwide Petroleum Corp	Russell Mc Connell	Pa Gas Co No. 1595	Mill Creek Electric Co	Britton et al
TOWNSHIP		Jay	Jay	Jay	Jay	Jay	Girard	Conneaut	Conneaut	Springfield	Conneaut
QUADRANGLE		Benezette 275	Benezette 274	Benezette 273	Penfield 236	Ridgway 4	Girard 38	Girard 34	Girard 44	Girard 39	Girard 36
LATITUDE		12,700 ft. S. 41° 20'	1480 ft. N 41° 15'	1700 ft. N 41° 15'	850 ft. S 41° 15'	3300 ft. N 41° 15'	8450 ft S 42° 00'	10,000 ft. N. 41° 50'	200 ft. S. 41° 55'	2600 ft. S 41° 55'	13,000 ft. N 41° 50'
LONGITUDE		3750 ft E. 78° 30'	11,200 ft. W 78° 25'	2050 ft. E. 78° 30'	6800 ft. W 78° 30'	10,650 ft. W. 78° 30'	50 ft. E 80° 20'	14,600 ft W 80° 25'	10,100 ft. W 80° 20'	4850 ft. W. 80° 30'	2250 ft. W 80° 30'
DATE COMPLETED		12 - 27 - 60	4 - 11 - 60	2 - 10 - 60	2 - 6 - 60	1 - 26 - 60	6 - 29 - 60	8 - 26 - 60	12 - 30 - 60	6 - 6 - 60	5 - 27 - 60
ELEVATION		1704 DF	1800 DF	1740	1201 DF	1707 DF	842 DF	974 RT	880	842 RT	956 DF
TULLY		6468 -	6339 - 6460	6547 - 6667	6112 -	6584 -	1490 - 1533	1860 - 1867		1590 -	
ONONDAGA	LIMESTONE		7022 -	7184 -	6725 -	7190 -	1690 -	2020 - 2292	1850 -	1762 -	1923 -
	CHERT		7038 -	7199 -	6738 -	7208 -					
ORISKANY			7074 - 7095	7239 - 7267	6785 - SW at 6791	7252 - 7283 SG 7254-58	1955 - 1964	2292 - 2297	2110 - 2116	2043 - 2052	2206 - 2220
HELDERBERG			7095 -	7267 -		7283 -	Bass Island 1980 -	Bass Island 2297 -	SW at 2139-49	Bass Island 2090 -	
SALINA							2057 -	2371 -	2213 -	2164 -	
GUELPH-LOCKPORT							2525 - Black water at 2690	2891 - 3170	2715 - Black water at 2921	2603 -	2805 - Black water at 2940
MEDINA	RED MEDINA (GRIMSBY)						2880 - Gas, 2936-54	3260 ± - 3349 400 Mcf gas ± 50	3075 -	2985 ± - SG	3185 - Gas 3205 - 40
	WHITE MEDINA (WHIRLPOOL)							3424 - 3438	3231 - 3250	3146 - 3150	3348 -
QUEENSTON								3438 -	3250 -	3150 -	3359 ±
TOTAL DEPTH		7574	7110	7283	6797	7284	2964	5935	3348	3215	3350
DEEPEST FORMATION REACHED		Hamilton	Helderberg	Helderberg	Oriskany	Helderberg	Medina	Gatesburg	Queenston	Queenston	Queenston
RESULT		Dry Abandoned	Dry Abandoned	Dry Abandoned	6000 ft SW Abandoned	582 Mcf gas AF RP 2860 psi 46 hrs.	100 Mcf gas AF RP 950 psi	Reedsville, 4285 - Utica, 5000 - Trenton BR, 5223 Glenwood, 5863 Gatesburg, 5888 SG Abandoned	Dry Abandoned	45 Mcf gas, AF RP 525 psi, 7 days Well turned over to farmer for private use	400 Mcf gas AF RP 845 psi 24 hrs.

SUMMARIZED RECORDS OF DEEP WELLS

COUNTY		Erie	Erie	Erie	Erie	Erie	Fayette	Fayette	Fayette	Fayette	Greene
MAP NUMBER		81	82	83	84	85	86	87	88	89	90
NAME OF WELL		F Kominski 1	Pa Game Comm Tract 10, A Vol (C Comelys)	Vojtko 1	Wilkinson 1	DW Tompson 1	Jesse Hull 1	Mueller - Herr 2	Frank Stewart 1	Earl Rahl	NA Herrington 1
OPERATOR		Mercantile Petroleum Corp	Belmont Oil Corp	Olson et al	Worldwide Petroleum Corp	T Vandenbury	Manufacturers Light & Heat Co	Manufacturers Light & Heat Co	Manufacturers Light & Heat Co	Peoples Nat Gas Co and Snee & Eber's	John T Daley
TOWNSHIP		Elk Creek	Conneaut	Girard	Conneaut	North East	Stewart	Stewart	Henry Clay	Wharton	Franklin
QUADRANGLE		Girard 33	Girard 42	Girard 41	Girard 37	North East 25	Confluence 7	Confluence 6	Confluence 9	Uniontown 35	Waynesburg 1
LATITUDE		7500 ft N 41°55'	11,300 ft N 41°50'	11,150 ft N 41°55'	9600 ft N 41°55'	9850 ft N 42°10'	15,000 ft S 39°55'	6250 ft N 39°50'	10,850 ft N 39°45'	7250 ft N 39°45'	6400 ft S 39°55'
LONGITUDE		3300 ft W 80°20'	7000 ft E 80°30'	2750 ft W 80°20'	8500 ft E 80°25'	8350 ft W. 79°50'	2200 ft W 79°25'	5700 ft W 79°25'	4850 ft E 79°30'	6600 ft W 79°40'	10,200 ft E 80°10'
DATE COMPLETED		1 - 6 - 60	8 - 10 - 60	7 - 27 - 60	6 - 10 - 60	10 - 17 - 60	10 - 12 - 60	8 - 27 - 60	12 - 5 - 60	12 - 31 - 60	12 - 5 - 60
ELEVATION		1225	946 DF	876 DF	852 DF	984 DF	1755	1561 DF	2478	2388	1082
TULLY		1653 - 1685		1621 - 1642	1625 -	525 - 600	Hamilton, 6120 -	Hamilton, 5317 -	Hamilton, 7800 -	6979 -	7350 -
ONONDAGA	LIMESTONE	840 -	1915 - 2255	1800 -	1822 -	1740 - 1990		6440 - 6465	8374 - 8404 -	7579 - 7602 - Gas in upper part	7681 7701 -
	CHERT										
ORISKANY		2153 - SW at 2165	2255 - 2265 Sa at 2260 SW at 2264	2059 - SW	2088 - Hole full water	1990 - 2103 SW at 2103		6610 -	8570 -	8006 - SW at 8018	7930 - Sulsar 7953
HELDERBERG			Bass Island 2265 -			Bass Is. and 2103 -			8687 -		
SALINA				1st Salt 2527 - 2577							
GUELPH-LOCKPORT		Black water at 2247	Black water at 3022	Black water at 2216	Black water at 2897	2300 ft SW at 2690					
MEDINA	RED MEDINA (GRIMSBY)	3042 - Gas	3229 - 55 Mcf, 3338-44	3012 - Gas 3039-63	3015 -	2774 - 2897 Gas					
	WHITE MEDINA (WHIRLPOOL)		3344 - 3414			2920 - 2941					
QUEENSTON			3404 -			2947 -					
TOTAL DEPTH		3440	3417	3127	3111	2957	7450	6094	8831	8122	8067
DEEPEST FORMATION REACHED		Grimsby	Queenston	Medina	Medina	Queenston	Hamilton	Oriskany	Helderberg	Oriskany	Helderberg
RESULT		Dry Abandoned	600 Mcf gas 4 F RP 920 psi 65 hrs Discovery Well Tracy Pool	3 Mcf gas 4F RP 332 psi	310 Mcf gas 4F RP 933 psi	930 Mcf gas 4F RP 865 psi 24 hrs Discovery Well Burgess Pool	Dry Abandoned Marcellus 6320 2nd Venango 6972 -	10,260 Mcf gas 4F RP 3450 psi 48 hrs	Dry Abandoned	381 Mcf gas 4F RP 800 psi 24 hrs Discovery Well East Summit Pool	42 Mcf gas 4F RP 2775 psi Abandoned

TABLE II SHEET 10

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Indiana	Jefferson	Jefferson	Jefferson	Jefferson	Jefferson	Jefferson	McKean	Potter	Potter
MAP NUMBER		91	92	93	94	95	96	97	98	99	100
NAME OF WELL		John C Alwine 1	Verstine & Kline, No 1	J Bobol 1	Myers J Owens 1	R & P Coal Co 1	Burl Walls 1	L B Humphrey Estate No 1	Mallory et al 1	Emporium Lumber Co, 1	Pa Tract 81 4
OPERATOR		Felmont Oil Corp	F C Deemer	Sam Jack Drilling Co	NYSNG Corp N-778	Sam Jack Drilling Co	NYSNG Corp N-792	Aloddin Petroleum Corp	Thunder Rock Producers	Lee E Minter et al	Phillips Petroleum Co
TOWNSHIP		Brush Valley	Eldred	Winslow	Winslow	Winslow	Winslow	Snyder	Foster	Wharton	Stewardson
QUADRANGLE		Indiana 9	Brookville 1	Du Bois 21	Du Bois 17	Du Bois 13	Du Bois 25	Hallton 3	Bradford 3	Conrad 34	Galeton 37
LATITUDE		18,800 ft S 40°35'	15,450 ft S 41°15'	12,750 ft S. 41°05'	3600 ft N. 41°05'	4650 ft N 41°05	4000 ft S. 41°05'	7200 ft N 41°15'	650 ft S 42°00'	4300 ft N 41°30'	14,700 ft N 41°30'
LONGITUDE		2750 ft W 79°00'	20,950 ft W 79°00'	4500 ft E. 78°55'	7500 ft E 78°50'	150 ft W 78°50'	7300 ft E 78°50'	9200 ft W 78°45'	9200 ft W 78°40'	5000 ft W 77°55'	4400 ft W 77°40'
DATE COMPLETED		2-25-60	9-2-60	10-25-60	10-8-60	7-19-60	11-10-60	3-28-60	12-1-60	1-3-60	8-25-60
ELEVATION		1689 RT	1680	1650 DF	1671 DF	1438 DF	1478 DF	1799	2345 DF	1691	1572 DF
TULLY				6460-	6940-	6220-	6630-	6548-	4264-	6020-6040	5253-
ONONDAGA	LIMESTONE	8257-	Cased in Onon to 6230	6995-	7498-	6760-	7183-	7030-	4604-		6091-
	CHERT	8275- SG		7015-	7513-	6778-	7200-	7044-	4649-		
ORISKANY		8417-		7090-	7578	6841-	7257- Gas at 7260	Horizon of 7100	4683-		6101-
HELDERBERG				7097-	7600	6874-	7287-	7101-			6146-
SALINA											
GUELPH-LOCKPORT											
MEDINA	RED MEDINA (GRIMSBY)										
	WHITE MEDINA (WHIRLPOOL)										
QUEENSTON											
TOTAL DEPTH		8447	6230	7110	7605	6889	7289	7139	4685	6040	6149
DEEPEST FORMATION REACHED		Helderberg	Onondaga	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Oriskany	Hamilton	Helderberg
RESULT		SG & SW AF Abandoned	Not drilled in. To be completed later	Dry in Oriskany Plugged back to 1070 300 Mcf gas 1000-1060	Oriskany-dry Plugged back to 1828 to frac shallow sand 1½ Mcf gas AF Abandoned	Oriskany-dry SG & SW in shallow sand 323 Mcf gas at 2925 Abandoned	1061 Mcf gas natural RP 3778 psi 89 hrs, 1 bbl SW Discovery Well Sykesville Pool	Dry Abandoned	500 Mcf gas natural RP 1825 psi, 16 hrs show distillate Discovery Well Mallory Pool	Dry Abandoned	517 Mcf gas AF RP 3450 psi 72 hrs.

TABLE II SHEET II

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY	Potter	Potter	Somerset	Somerset	Somerset	Somerset	Somerset	Somerset	Somerset	Somerset
MAP NUMBER	101	102	103	104	105	106	107	108	109	110
NAME OF WELL	Pa Tract 81 5	Pa Tract 81 6	Pa Game Lands Tract 111A, No 1	Pa Game Lands Tract 111A, No 2	Pa Tract 75 4	Bird Coal Co 1	C W Friedline 1	Peoples Nat Gas Co (Fechi) No 4218	Robert I. Snyder 1	Leroy Wilt 1
OPERATOR	Phillips Petroleum Co	Phillips Petroleum Co.	Manufacturers Light & Heat Co	Manufacturers Light & Heat Co	The Peoples Natural Gas Co	Peoples Nat Gas Co and Snee & Eberly	Felmont Oil Corp.	The Peoples Natural Gas Co	Felmont Oil Corp and Peoples Nat Gas Co	Felmont Oil Corp and Peoples Nat Gas Co
TOWNSHIP	Stewardson	Stewardson	Lower Turkey Foot	Lower Turkey-Foot	Jefferson	Jenner	Lincoln	Jefferson	Lincoln	Lincoln
QUADRANGLE	Galeton 38	Galeton 40	Confluence 5	Confluence 8	Donegal 27	Somerset 20	Somerset 19	Somerset 16	Somerset 17	Somerset 15
LATITUDE	10,250 ft N 41°30'	9050 ft. N 41°30'	10,100 ft. S 39°55'	13,800 ft S. 39°55'	18,700 ft S. 40°05'	3400 ft. S 40°15'	6500 ft N 40°05'	9900 ft S 40°05'	8600 ft N 40°05'	1000 ft S 40°05'
LONGITUDE	11,400 ft W 77°40'	9400 ft E 77°45'	6500 ft E 79°25'	8700 ft E. 79°25	700 ft W. 79°15'	5800 ft E 79°05'	1150 ft E 79°05'	300 ft E. 79°15	1400 ft W 79°05	2600 ft E. 79°05'
DATE COMPLETED	10-12-60	12-30-60	2-25-60	10-27-60	5-27-60	12-9-60	9-21-60	5-20-60	6-16-60	3-12-60
ELEVATION	1417 RT	1943 DF	2584	2427	2632	2195	1941 RT	2821	2037 RT	2059 RT
TULLY	5088 -	5620 -	Hamilton, 7502 -	Hamilton, 7621 -	Hamilton, 7765 -	6968 -	7568 - Hamilton, 7650 -	Hamilton, 7914 -	7460 -	Hamilton, 7485 -
ONONDAGA LIMESTONE	5893 -	6414 -	8120 -	8207 -	8890 -	7919 -	8460 -	8670 -	8392 -	8306 -
ONONDAGA CHERT			8147 -	8228 -	8915 -	7946 -	8483 -	8690 - SG	8414 -	8329 - SG
ORISKANY	5901 -	6427 -	8300 -	8382 -	9085 -	8090 - Gas at 8135			8520 - 95 Mcf gas 8574 - 8578	8460 - SG
HELDERBERG			8405 -							
SALINA										
GUELPH - LOCKPORT										
MEDINA RED MEDINA (GRIMSBY)										
MEDINA WHITE MEDINA (WHIRLPOOL)										
QUEENSTON										
TOTAL DEPTH	5909	6436	8435	8493	9130	8170	8586	8791	8625	8560
DEEPEST FORMATION REACHED	Oriskany	Oriskany	Helderberg	Helderberg	Oriskany	Oriskany	Onondaga	Onondaga	Oriskany	Oriskany
RESULT	4855 Mcf gas natural RP 3900 psi 24 hrs	7770 Mcf gas AF RP 3235 psi 7 days	1917 Mcf gas AF RP 3370 psi 72 hrs Discovery Well Rugg Pool	Dry Abandoned	Dry Abandoned	162 Mcf gas AF RP 2170 psi 72 hrs Abandoned	300 Mcf gas AF RP 1897 psi 63 hrs	Show of gas Abandoned	1572 Mcf gas AF RP 3293 psi 44 hrs Discovery Well Snyder Pool	1275 Mcf gas AF RP 2771 psi 48 hrs

TABLE II SHEET 12

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY		Tioga	Tioga	Tioga	Venango	Warren	Warren	Warren	Washington	Westmoreland	Westmoreland
MAP NUMBER		111	112	113	114	115	116	117	118	119	120
NAME OF WELL		Campbell 1	John P. Rice 1	Harry P Davey 1	Burkhardt 1	Frank Kapp 1	Lot 515 2	Warrant 5555 1	Lewis Foley 1A	A Donitzen 1	John R. Tinkey 1
OPERATOR		Kewanee Oil Co.	C&J Enterprises	AYSNG Corp A-787	Engles	Biery and Johnson Co	Hill and Smith	S Penn Oil Co and J.T.Mallory et al	Benedum Trees Co	Mid Atlantic Oil & Gas Co	Belmont Oil Corp and Peoples Nat Gas Co
TOWNSHIP		Delmar	Shippen	Elk	Sugar Creek	Limestone	Watson	Glade	Robinson	Donegal	Donegal
QUADRANGLE		Antrim 12	Antrim 3	Galeton 39	Franklin 2	Tidioute 4	Warren 11	Warren 10	Burgettstown 5	Donegal 28	Donegal 26
LATITUDE		11,000 ft N 41°40'	19,100 ft S 41°45'	7300 ft N 41°40'	6500 ft. N. 41°25'	1800 ft N 41°40'	7000 ft N 41°15'	15,500 ft S 41°55'	2500 ft S 40°25'	500 ft N 40°05'	1200 ft N 40°05'
LONGITUDE		3700 ft W 77°20'	1300 ft W. 77°25'	12,000 ft W. 77°30'	9700 ft. E. 79°55'	11,000 ft W 79°20'	7500 ft E 79°45'	3500 ft W 79°00'	4500 ft E 80°20'	8700 ft W 79°15'	11,000 ft W 79°15'
*DATE COMPLETED		9-23-60	4-6-60	4-2-60	11-30-60	9-27-60	9-2-60	3-25-60	9-15-60	12-16-60	8-31-60
ELEVATION		1757 DF	1875 DF	1592 DF	1030 DF	1583	1908	1969	1136	2544	2434
TULLY		4452	5010-5078	4805-	3558-3635	3985-4040	4029-	4150-4191	5720-	Hamilton, 7410-	Hamilton, 7450-
ONONDAGA	LIMESTONE	5445-	5930-	5659-	3792-	4279-4354	4504-	4436-	6007-	7999-	8077-
	CHERT								6022-	8023-	8099- 5G, SW at 8140
ORISKANY		5460-	5962-	5684-	3913- SW at 3913	4354-		4508-	6189-	8222-	
HELDERBERG		5504-		5710-		4366-4480		4520-	6248- Keyser, 6428-		
SALINA											
GUELPH-LOCKPORT						5235- Black water at 5379					
MEDINA	RED MEDINA (GRIMSBY)					5648- 20 Mcf gas at 5729					
	WHITE MEDINA (WHIRLPOOL)					5817-					
QUEENSTON						5830-					
TOTAL DEPTH		5611	6081	5715	3913	5850	4542	4528	6575	8300	8201
DEEPEST FORMATION REACHED		Helderberg	Helderberg	Helderberg	Oriskany	Queenston	Onondaga	Helderberg	Keyser	Oriskany	Onondaga
RESULT		Dry Abandoned	Dry Abandoned	Dry Abandoned	1200 ft SW at 3913 Abandoned	Show of gas Abandoned	Show of oil at 4542 Abandoned	Dry Abandoned	170 Mcf gas AF, at 6439 1000 ft SW in 12 hrs Abandoned	SW AF Abandoned	10 Mcf gas 2 bbls SW/day RP 500psi 5days Abandoned

SUMMARIZED RECORDS OF DEEP WELLS (continued)

COUNTY	Westmoreland	Westmoreland	Westmoreland	Westmoreland	Westmoreland	Westmoreland				
MAP NUMBER	121	122	123	124	125	126				
NAME OF WELL	Paul McKelvey 1	Boswell Lumber Co. 1	Pa Game Comm Tract 42D, No1 (Misty Unit)	Pa Game Comm Tract 42D, No3 (Reed Unit)	E T Stibich 1	Pa Game Comm Tract 42D, No2 (Hutton Unit)				
OPERATOR	The Peoples Nat Gas Co.	Peoples Nat Gas Co. and Snee & Eberly	Felmont Oil Corp	Felmont Oil Corp.	Felmont Oil Corp	Felmont Oil Corp and Peoples Nat Gas Co				
TOWNSHIP	Derry	Fairfield	St Clair	St Clair	Fairfield	Ligonier				
QUADRANGLE	Latrobe 10	New Florence 14	New Florence 16	New Florence 15	New Florence 17	Somerset 18				
LATITUDE	9300 ft S. 40°20'	15,200 ft S 40°20'	3500 ft S. 40°20'	2000 ft N 40°20'	9000 ft S. 40°20'	4000 ft S 40°15'				
LONGITUDE	10,000 ft W. 79°15'	6500 ft E 79°05'	10,500 ft W 79°00'	2800 ft W 79°00'	13,500 ft W. 79°00'	12,400 ft W 79°05'				
DATE COMPLETED	3-28-60	5-23-60	10-6-60	5-22-60	12-13-60	3-4-60				
ELEVATION	2066	2702	2551 RT	2481 RT	2280 RT	1921 RT				
TULLY	Hamilton, 7096-7160				Hamilton, 6[illegible]-	6796-				
ONONDAGA LIMESTONE	7770-	7305-	7491-	7393-	7202-	7665-				
ONONDAGA CHERT	7787-	7408- 115 Mcf at 7460	7509- Gas at 7519	-420- Gas 7435-40	7222-	7688-				
ORISKANY	7906-	7541- 85 Mcf at 7580				7836-				
HELDERBERG						7949-				
SALINA										
GUELPH-LOCKPORT										
MEDINA FED MEDINA (GRIMSBY)										
MEDINA WHITE MEDINA (WHIRLPOOL)										
QUEENSTON										
TOTAL DEPTH	7960	7585	7534	7495	7260	7955				
DEEPEST FORMATION REACHED	Oriskany	Oriskany	Onondaga	Onondaga	Onondaga	Helderberg				
RESULT	504 Mcf gas AF RP 3600 psi 10 days	9115 Mcf gas natural RP 2900 psi 24 hrs	4150 Mcf gas natural show salt water RP 2794 psi 13 days	1000 Mcf gas natural RP 2836 psi 7 days Discovery Well Baldwin Pool	3250 Mcf gas natural 1 gal SW 1 min RP 2860 psi 60 hrs	37 Mcf gas and SW AF Abandoned				

TABLE 12

DEEP WELL SAMPLES COLLECTED

DURING 1960

Table 12
Supplement to Catalogue of Deep Well Samples
(Information Circular No. 15)
January 1960 to January 1961

COUNTY Quadrangle & No.	Operator	Farm Name	Total Depth	Year Compl.	Sampled Interval From	To	Deepest Formation Sampled
BEAVER							
Sewickley 2	J & L Steel Co.	J & L Disposal #1	5445	60	230	5250	Onondaga
BEDFORD							
Clearville 4	N.Y.State Nat. Gas #658	Aaron Morris #1	5150	59	0	5155	Upper Dev.
Clearville 5	N.Y.State Nat. Gas #747	P.S.Akers #1	4755	60	40	4585	Onondaga
Clearville 6	N.Y.State Nat. Gas #761	Arlie Morral #1	4712	60	50	4712	Oriskany
Clearville 7	N.Y.State Nat. Gas #760	Robert Morris #1	6435	60	50	6435	Helderberg
CAMERON							
Benezette 269	Godfrey L.Cabot	Pardee #2	6736	58	6661	6736	Helderberg
CLEARFIELD							
DuBois 9	N.Y.State Nat. Gas #758	Wm.Fairman #2 (Hopkins #2)	7109	60	70 6152	2500 7100	Oriskany
DuBois 10	N.Y.State Nat. Gas #759	Dallas Miller #1	7260	60	1500 5300	1900 7220	Onondaga
DuBois 11	N.Y.State Nat. Gas #768	R & P Coal #1	7270	60	18	7190	Onondaga
DuBois 12	N.Y.State Nat. Gas #771	O.M.Manges #1	7281	60	10 6350	2500 7280	Oriskany
Penfield 90	Wfrs. Lt. & Pt. #4457	Green Glen #1	7168	57	7070	7156	Oriskany
Penfield 149	N.Y.State Nat. Gas #680	Pa. Tract 66 #1	7036	59	30	5920	Upper Dev.
Penfield 167	N.Y.State Nat. Gas #696	Pa.Tract 66 #4	7294	59	200 1800 5470	800 2550 7200	Onondaga
Penfield 170	James Drlg. Co.	R.Anderson #1	7351	59	270	7353	Oriskany
Penfield 173	James Drlg.Co.	R.Anderson #2	7401	59	100	7401	Oriskany
Penfield 191	N.Y.State Nat. Gas #727	Helen Gordon #11	7164	59	6400	7100	Onondaga
Penfield 205	James Drlg. Co.	Anna M.Shutters #1	6988	59	1075	6150	Upper Dev.
Penfield 229	Devonian Oil & Gas	Wt. 5057 #3 (Now Shawmut #3)	7025	59	0	7050?	Oriskany
Penfield 264	Rockton Drlg. Co.	Green Glen #1	7582	60	59	7577	Onondaga
Penfield 268	N.Y.State Nat. Gas #791	Herman Delp #1	7227	60	1200 5110	1300 7227	Helderberg
Penfield 269	N.Y.State Nat. Gas #794	Wm. Barr #1	7437	60	700 5000	900 7435	Oriskany
Punxsutawney 32	F.C.Deemer	B.W.Irwin #2	7605	59	5300	7555	Onondaga
CRAWFORD							
Girard 40	Pa.Gas Co. #1594	Lewis Sergeant #1	3463	60	0	3467	Queenston
Girard 43	George Hall et al	J. Lehman #1	3600	60	0	3596	Medina
ELK							
Benezette 272	N.Y. State Nat. Gas #679	Dents Run Coal #2	7000	59	0	6760	Onondaga
Benezette 273	James Drlg. Co.	Winifred Smith #1	7283	60	1440	7283	Helderberg
Benezette 274	Shell Oil Co.	Pa. Tract 84 #1	7110	60	20	7110	Helderberg

ERIE							
Erie 56	Chas. Siegel	C.A.Blass #1	3282	58	2976	3184	Grimsby
Erie 95	H.D.Brown	Zimmerly #1	3248	56	2345	3199	Queenson
Erie 106	V.R.Stephens	A.Babb #1	2308	57	2012	2305	Bass Island
Girard 29	C.Siegel (Gt. Lakes Nat.Gas)	Farley Pierce #1	2850	58	1556	2850	Queenston
Girard 30	World Wide Pet.Co.	Korynoski #1 (Packan,Aldrich)	3160	59	2035	3134	Cabot Head
Girard 34	Russell McConnell	Borst #1	5935	60	329	5932	Gatesburg
Girard 36	Britton et al	Huston #2	3360	60	300	3317	Cabot Head
FAYETTE							
Confluence 2	Mfrs. Lt. & Ht. #4522	Mueller-Herr #1	7039	59	180	7048	Oriskany
Confluence 9	Mfrs. Lt. & Ht. #4592	Frank G.Stewart #1	8831	60	1000	8838	Helderberg
INDIANA							
Elders Ridge 34	N.Y.State Nat. Gas #653	Emil Abel #1	7747	58	0	1101	Pocono
Elders Ridge 38	N.Y.State Nat. Gas #695	S.E.Dible #1	7825	59	40	7500	Hamilton
Elders Ridge 39	T.W.Phillips Gas & Oil	R.S.Uncapher #1	7812	59	6700	7805	Oriskany
New Florence 11	Minter et al	Vinton Land Co.#2	8045	58	6850	7968	Onondaga
JEFFERSON							
Hallton 3	Aladdin Pet.Corp.	Lee B.Humphreys #1	7139	60	10	7136	Helderberg
LUZERNE							
Wilkes Barre 1	United Producing Co. Inc.	Parvin Good #1	7583	59	0	7583	Clinton
MERCER							
Stoneboro 5	Mercury Oil & Gas	Vance Partridge #1	3710	59	743	3710	Oriskany
POTTER							
Galeton 35	Phillips Petroleum	Pa. Tract 81 #3	6416	59	5400	6416	Helderberg
SOMERSET							
Somerset 17	Felmont Oil Corp. #109	Robert Snyder #1	8625	60	1105	8325	Hamilton
SUSQUEHANNA							
LePaysville 4	Kewanee Oil	E.J.Moran #1	5576	59	0	5570	Helderberg
TIOGA							
Galeton 34	Ward Denman	Van Tine #1	5477	59	988	5477	Helderberg
VENANGO							
Franklin 2	Engles	Burkhardt #1	3915	60	140	3913	Oriskany
WARREN							
Tidioute 4	Biery & Johnson Co.	Frank Kapp #1	5850	60	0	5833	Queenston
WESTMORELAND							
New Florence 15	Felmont Oil Corp. #F96	Pa. Tract 42 #3	7495	60	1330	7495	Onondaga